A Database Publication

THE MICRO USER

Volume 6
Number 3
May 1988
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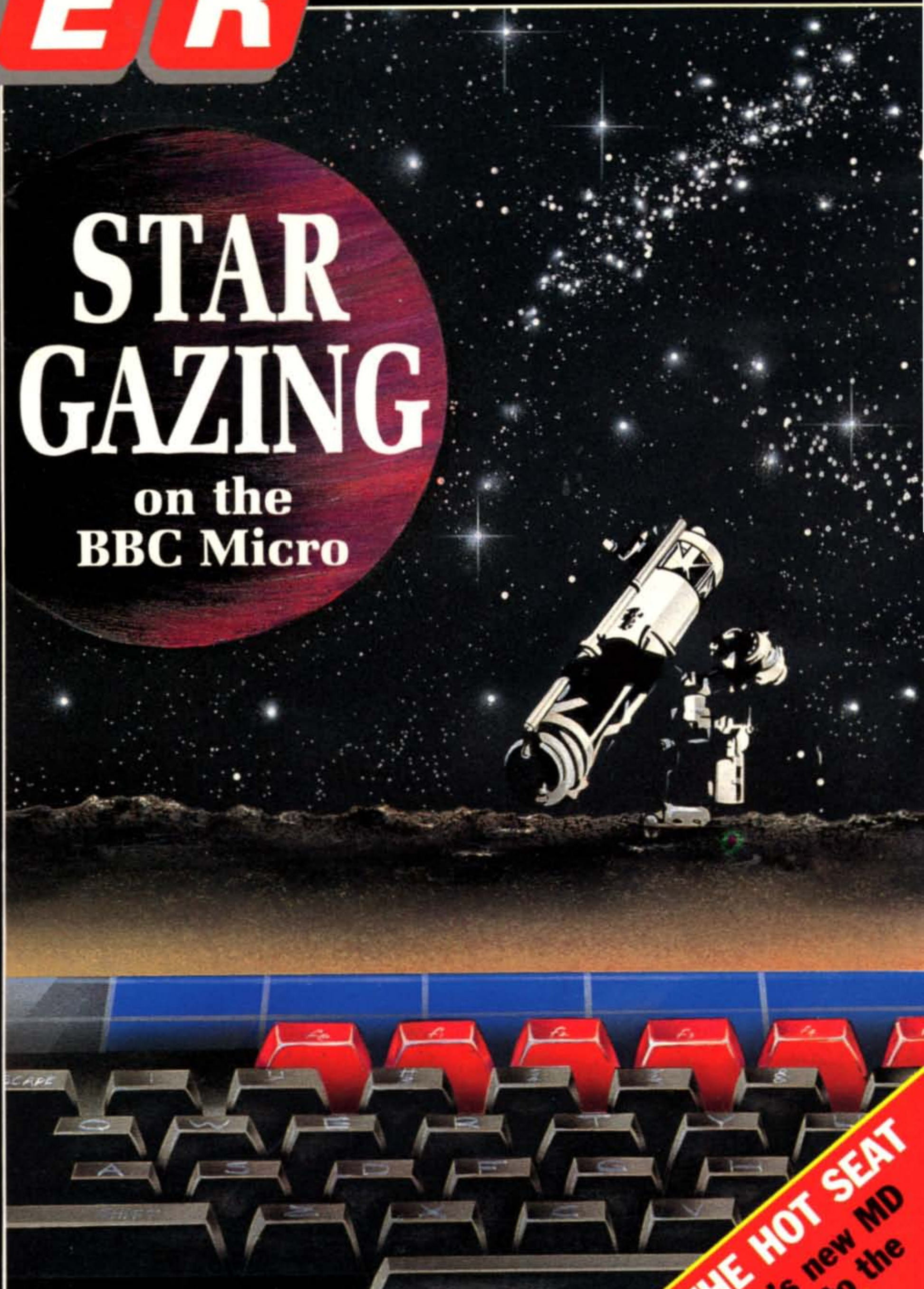
Top-selling guide to the BBC Micro, Master, Archimedes and Z88



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on the
BBC Micro

BODY BUILDING
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Crazee Rider, a fascinating motorcycle-racing game, features seven international racetracks. "It's fast, challenging and there's plenty to keep you entertained. Thoroughly recommended" remarked The Micro User.

Galaforce is the thinking-man's alien-zapping game; fast and furious, yet full of strategy. Oracle enthused: "You haven't lived until you've played this game. Buy it! — it's the ultimate in shoot-em-up. RATING: 20 (out of 20)."

Codename: Droid is a challenging arcade-adventure. The quality of the graphics and animation must be seen to be appreciated. Electron User summed the game up by saying "CODENAME: DROID is brilliant . . . it's worth every penny."

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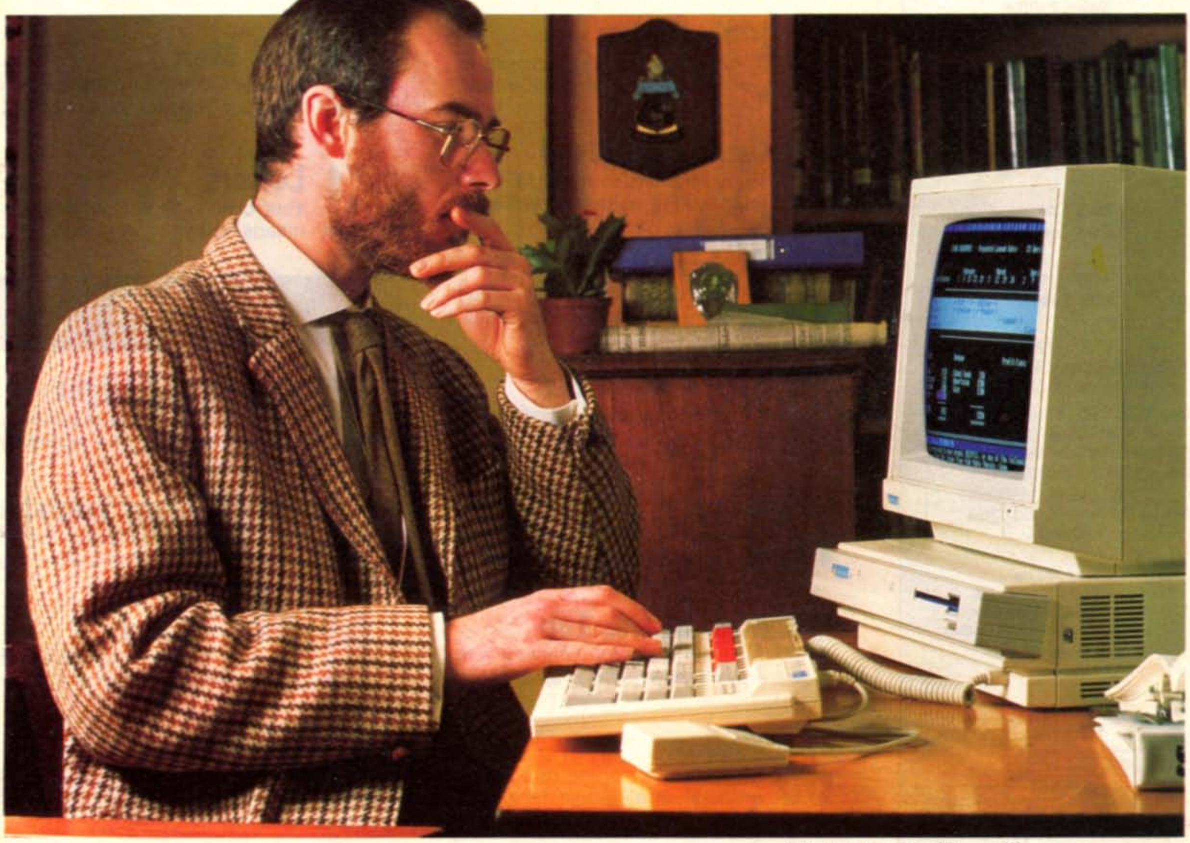

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Published by:
Database Publications Ltd,
Europa House, Adlington Park,
Adlington, Macclesfield SK10 4NP.

Subscription rates for
12 issues, post free:

£15 – UK
£25 – Europe (incl. Eire)
£31 – Overseas Surface
£42 – Overseas Air

ABC 59,727
Jan-June 1986
ISSN 0265-4040

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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News trade distribution: Diamond Europress Sales & Distribution, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

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Now go star-gazing on your BBC Micro with the help of our type-in listing of

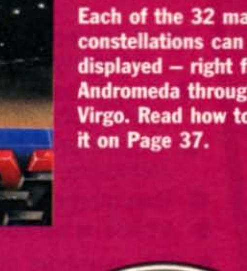
NIGHT SKY

Each of the 32 major constellations can be displayed – right from Andromeda through to Virgo. Read how to do it on Page 37.

Join our search for the most innovative use of a BBC Micro or Archimedes and you could share

OVER £1,700

worth of prizes that go to winners of The Micro User Innovation Awards for 1988. Full details are on Page 84



One of the most exciting games ever created for 8 bit micros is

STARQUAKE

Turn to Page 158 for an exclusive opportunity to get this mega game for yourself – absolutely free!

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow users of *The Micro User*. Turn to **Pages 130 to 131** to find just what you're looking for – from cheap modems to complete computer systems.

Get it right!

All major listings in this issue are accompanied by a checksum to help overcome any typing mistakes. For full details of how they work, see the article on Page 28 of the February issue of *The Micro User*.

NEXT MONTH

GAME
Blast the Beastiroids
UTILITY
Easy Basic Overlays
PEEPSHOW
Save screens instantly
REVIEW
Predicta Type

THE MICRO USER

June 1988 issue on sale May 4

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RISC USER

For Archimedes users

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BEEBUG

The magazine is now in its sixth year of publication with 20,000 subscribers throughout the world. Its proven format has been invaluable to serious BBC Micro and Master computer users in the home, education and business.

Each issue of BEEBUG provides 72 pages of articles, programs (utilities, applications etc), tutorials, workshops, reviews, hints & tips, news and information for beginners and experts alike. All our programs are tested on all versions of the BBC Micro, and are also available monthly on disc or tape.

RISC USER

This is the magazine for everyone interested in Acorn's RISC computer, the Archimedes. Launched at the same time as Archimedes, RISC User provides lively and informed coverage of what's happening in the world of Archimedes.

Reviews, hints, programs and articles are all specifically written for Archimedes, showing how to exploit the many features of this sophisticated computer. RISC User is all about the Archimedes; it does not contain modified programs originally intended for the Model B or Master.

BEEBUG and RISC User are both published 10 times a year and are only available on subscription, not through the shops.

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MU 5

NEWS beat

Dram problems to force price rise?

JAPANESE restrictions on memory chip production – prompted by trade disputes with the States – could have a knock-on effect for Acorn.

Price rises have already been implemented by Atari and Amstrad – and Acorn could well be forced to follow suit, at least for the Archimedes.

The problem centres around drams – dynamic random access memories – which are at the core of the more powerful computers.

"With machines like the Master 128, the amount of ram used forms a relatively small proportion of the overall manufacturing cost", said Acorn's Michael Page.

"But on an Archimedes 440, with four megabytes of memory, the relative cost is considerably higher.

"We expect the Archimedes to hold its price until mid April – after that we will seriously have to review the pricing policy".

The situation could be eased as and when UK manufacturers get chips into production, but in the short term price increases seem inevitable.

The pop prize

THE first winners from Every Second Counts, the new BBC family quiz shows hosted by Paul Daniels, collect an Archimedes. Marie and Lynas Lacey from Belfast answered questions on pop music against the clock. With them is Mr Ian Goodall; Acorn's sales manager for the UK (North) and Eire.

Easy route to WP

A PACKAGE designed specifically as a user-friendly introduction to word processing has been released by National Extension College (0223 316644).

WASP (Word and Symbol Processor) uses clear, concise menus and displays editing commands on screen, and all commands are initiated by single keystrokes.

But despite being simple to use WASP still offers powerful features.

It supports an 80 column display, sub and superscripting, full justification, emboldening and underlining.

Unusually, the package can also handle mathematical material and foreign languages. And, with a suitable printer, fonts and characters constructed with WASP's pixel builder can be output. WASP can be used with any BBC Micro with DFS, ADFS or Econet.

Price £19.95.

Leave it to your agent

FOR budding BBC Micro programmers intent on making their first million, actually getting a marketing company to take up their products can be pretty daunting.

Now, thanks to Marjacq Micro (01-724 0565) – an agency for programmmers run by Jacqui Lyons – all the hassle involved in finding markets and negotiating contracts is being made a lot easier.

Jacqui has been in business as an agent for some years. At first she dealt with literary publications, but more recently the emphasis has been towards promoting new computer programs.

"Big companies are more inclined to listen to an agency rather than to deal with individuals", she said.

"Using an agent makes the possibilities of getting a good program on to the market that much better".

Many of Marjacq Micro's clients started out as devoted BBC Micro programmers – indeed many of them still prefer it to more modern machines.

"We are always on the look out for good BBC Micro software. There is a vast user base for the machine and new programs are always welcome", she said.

Sir Clive regrets

THE Archimedes seems to have found itself another fan in the form of Sir Clive Sinclair.

He publicly sang the praises of the machine's Risc-based architecture when he provided the keynote speech at the recent RITA awards ceremony.

At the same time, however, he warned that despite being in a strong position with the technology, British companies like Acorn could eventually lose out because this country has no silicon manufacturing plant.

"We in this country do not have a single world standard wafer fabrication line", he said. "Korea has several, Japan dozens and America has a great many too.

"We do not have one. I think this is a great shame and a very serious matter".

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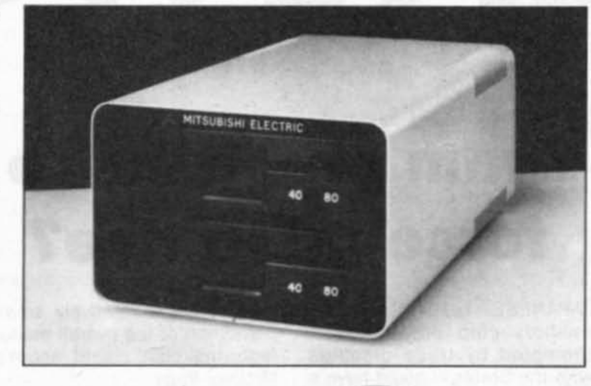

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NEWS beat

New sales supremo

LOOKING to build on its position as market leader in the schools sector, Acorn has appointed Ian Laurence as director of sales and marketing.

With a background in micro-based multi-user systems and networking products, he's well qualified to identify new openings for the company.

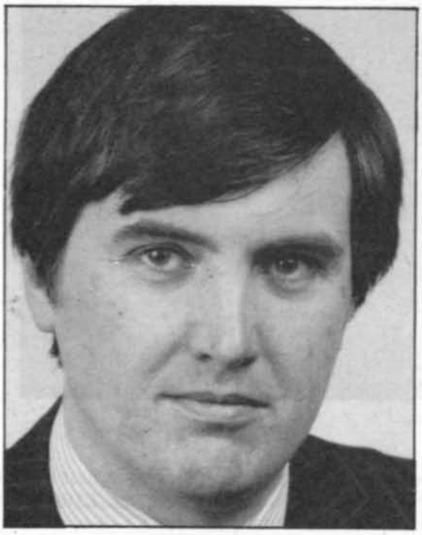
"Education is quite firmly the plank on which the rest of our business is built", said Acorn's managing director, Harvey Coleman.

"But the lessons that we've learnt supplying schools – in terms of understanding users' needs and meeting their demanding price/performance targets for quality, flexibility and ease of use – have been extremely valuable.

"We now see a number of market sectors that are ideally suited to the products we have developed".

Ian Laurence is particularly enthusiastic about Acorn's commitment to technical excellence, as embodied in the Archimedes. "The power that this technology offers coupled with the knowledge and experience of an installed base of over a million computers puts us in an enviable position as one of Britain's leading computer manufacturers", he said.

"I am extremely excited at the numerous opportunities that I have discovered in the short time that I have been with the company".



Ian Laurence: "Acorn is in an enviable position as one of Britain's leading computer manufacturers"

False move

IN our review of BBC Soft's bridge program, Black Queen – page 32 of the March issue of *The Micro User* – we inadvertently supplied the wrong telephone number.

The correct contact details are: BBC Soft, PO Box 234, London SE1 3TH. Tel: 01-576 0548.

Hush hush add-ons for BBC Micro

HUNDREDS of software and hardware bargains, plus exciting demonstrations of the latest Acorn technology, can be seen at the Electron & BBC Micro User Show, to be held at the New Horticultural Hall, Westminster, London.

Already the list of bargains is impressive, and many exhibitors have promised that the number of discounts will be bigger than ever – with reduced prices on software, printers, discs and modems.

And as always the show will be the launching pad for a number of exciting new products. Companies such as Slogger and PRES, say that they are working on a range of new add-ons for the BBC Micro that will further enhance the machine's capabilities and power.

Because of the nature of the products, they are keeping the developments a closely guarded secret until the show, but the companies say that the new items represent a huge financial investment and commitment to the machine.

Throughout the show there will be demonstrations of Acorn In Action. A team of experts will be demonstrating the very latest technology and showing how it is helping to bring new hope to sufferers of the eye disease glaucoma. There will also be a spectacular computer controlled laser light show, as well as demonstrations of a program developed by an amateur astronomer to detect distant galaxies.

And as if that was not enough, you will also be able to see your own heartbeats displayed, measure your manual dexterity, and hear your own voice backwards – all courtesy of the BBC Micro.

So whatever your interest there will be lots to see, do and buy at the Electron & BBC Micro User Show, at the New Horticultural Hall, Westminster, London, from May 13 to the 15.

For details of cut price admission tickets see Page 38.

Beebug problem

TECHNICAL problems with Beebug's internal modem for the Master 128 have now been ironed out, but BABT approval is still not forthcoming because of a very sticky problem.

After sorting out a minor power supply fault on the new modem, Beebug discovered that the little green sticker that signifies all is well with the product failed to meet the exacting standards demanded by the BABT board.

No matter how good a piece of communications hardware may be, if the sticker can't stand up to being washed down with petrol or water then approval will not be given.

However, new labels have been ordered and Beebug (0727 40303) says that the Master 128 internal modem is expected to be on sale shortly.

Price £119.

Shaping up

AN upgrade to the popular Pineapple PCB drafting program is now available along with a second rom which gives full automatic track routing capabilities.

Pineapple (01-599 1476) says that the autorouting option, which comes on a separate 16k rom, will work on a standard BBC Micro.

Price £85 for the PCB program and £110 for the autorouting rom.

Price cut

THE producer of best-selling software package Mini Office II – Database Software (0625 878888) – is passing on the benefits of success to its customers.

With development costs now covered, the price of the company's Mini Office II rom board for the BBC Micro has been slashed by more than £10 to £49.

NEWS beat

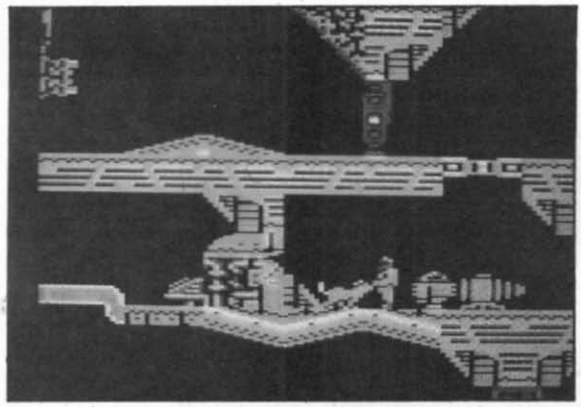
Rescue mission

THE latest offering from the Superior stable (0532 459453) – tentatively titled Exile – stems from the imaginations of Jeremy Smith of Thrust fame and Peter Irvine, author of Starship Command.

Exile comes with the Elite-style of packaging – a map and a novella relating the history of the ill-fated landing party that first set foot on a hitherto unexplored planet.

Your mission is simple: Rescue and destroy – rescue the landing party and destroy the base before the mad professor launches his man-eating worms on an unsuspecting universe.

The gameplay – spread across more than 200 smooth-scrolling screens – is innovative, with realistic movement, excellent graphics and complementary digitised sound.



Screen shot from Exile

New line in modems

THE UK's fastest growing electronic mail service – MicroLink – has launched its own range of officially approved low-cost modems, backed by comms software, for the BBC Micro.

The MicroLink entry-level modem offers two operating speeds – 1200/75 and 300 baud – while the multi-speed modem includes the faster 1200/1200 baud and is fully Hayes compatible.

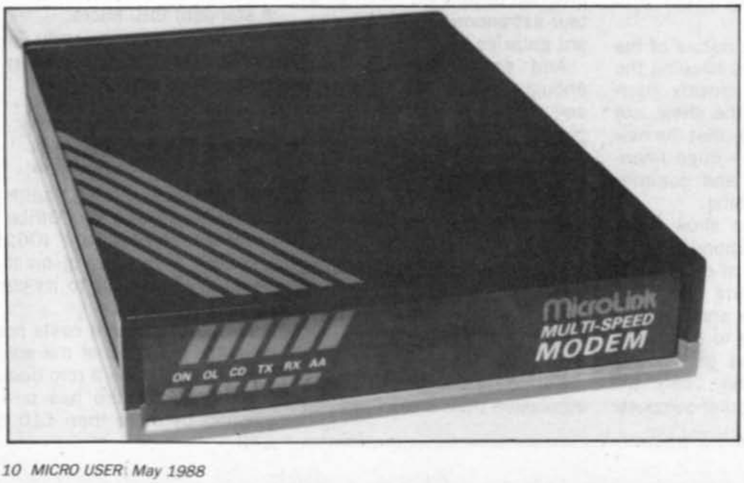
It also offers many sophisticated functions such as auto-answer and auto-dial. Both modems are accompanied by leads and comms and word processing software adapted from the Mini Office II suite.

The entry-level modem is priced at £99, the enhanced, multi-speed model at £169.

"We are delighted that we have been able to achieve such a remarkable price breakthrough", said Derek Meakin, head of MicroLink.

"The multi-speed modem really is an exceptional product, and there is nothing else on the market that comes anywhere near the £169 price mark".

A unique feature of both packs is that purchasers will be entitled to one month's free access to Britain's most popular electronic mail service, Telecom Gold, of which MicroLink is part.



MicroLink's multi-speed modem

Help? Of course...

HELP is at hand for anyone who wants to get a little more from their BBC Micro or Archimedes.

Acorn, aware that a lot of people have a lot of questions – and that there's nowhere to get them answered easily – is introducing a series of low-cost training courses.

"Acorn has long had a policy of insisting that its dealers attend courses", said Mike Howieson, Acorn's training manager.

"But up until now the company hasn't had anything to help the person who bought the machine".

One-day courses will include such topics as basic familiarisation with the Archimedes range, application software and hints and tips on converting Model B and Master software to run on the Archimedes.

Programmers have not been neglected and introductory courses are available on C and ARM assembler.

Two-day workshops are also on the cards, scheduled for the Easter and Summer holiday periods.

Fees – much lower than those normally charged – will start at around £65 a day.

Micros in the House

BBC Micros were on the agenda at the House of Commons recently.

Archie Kirkwood, Liberal Scottish affairs spokesman, wants the government to give a lead to schools looking to replace their BBC Bs.

He's especially concerned that earlier decisions to buy BBC Micros, often prompted by the DTI's Micros in Schools campaign, have led to schools being trapped in an Acorn "cul-de-sac".

And while schools will be looking at the Archimedes as the natural upgrade path, he feels that consideration ought to be given to IBM machines – which users are more likely to encounter once they leave school.

At the moment, the government does not issue guidance to education authorities. In the case of Scotland, advice is provided by the Scottish Council for Educational Technology.

THE GALLUP CHART TOP 20

BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software house)	TAPE PRICE
1	◁ 1	**STAR WARS** *Domark*	9.95
2	△ 19	**DOTTY** *Mastertronic*	1.99
3	▽ 2	**WINTER OLYMPIAD** *Tynesoft*	9.95
4	△ 5	**LEAGUE CHALLENGE** *Atlantis*	2.99
5	▽ 4	**LIFE OF REPTON** *Superior*	6.95
6	▽ 3	**PLAY IT AGAIN SAM** *Superior*	9.95
7	▽ 6	**10 COMPUTER HITS VOL 4** *Beau Jolly*	9.95
8	△ 14	**FIVE STAR GAMES 3** *Beau Jolly*	9.95
9	△ 10	**BONECRUNCHER** *Superior*	9.95
10	▽ 8	**GRAND PRIX CONSTRUCTION SET** *Superior*	9.95
11	△ 12	**PALACE OF MAGIC** *Superior*	9.95
12	△ 13	**SPITFIRE 40** *Mirrorsoft*	9.95
13	●	**PHANTOM** *Tynesoft*	7.99
14	▽ 9	**SURVIVORS** *Atlantis*	2.99
15	▽ 7	**SPELLBINDER** *Superior*	9.95
16	●	**PLAN B2** *BugByte*	1.99
17	●	**IMPACT** *Audiogenic*	9.95
18	●	**AROUND THE WORLD** *Superior*	6.95
19	●	**COMPUTER HITS 5** *Beau Jolly*	6.95
20	●	**PAPERBOY** *Elite*	9.95

Compiled by Gallup/Microscope

Star Wars retains last month's position, but is being challenged by Mastertronic's Dotty. Blue Ribbon's re-release of Steve Davis Snooker is another budget game worth watching over the next month. There are six new and re-entries, with compilations holding their own as always – look out for Play It Again Sam 2.

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ARCHIMEDES

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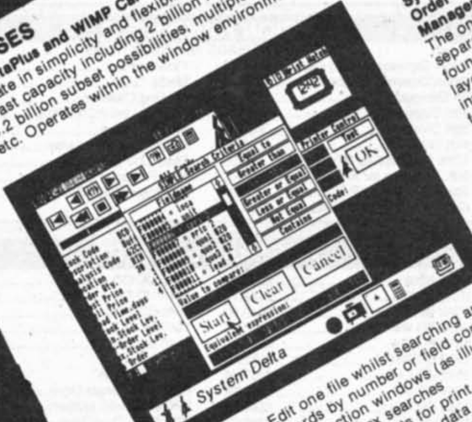
System DeltaPlus and WIMP Card Index £69.95
The ultimate in simplicity and flexibility. Unrivalled in power. Vast capacity including 2 billion records, 16 million fields. 4.2 billion subset possibilities, multiple files open at once, etc. Operates within the window environment.



- Multi-tasking. Edit one file whilst searching another
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DeltaBase £29.95 *Affordable excellence*
Extremely powerful yet simple to use general database. Over 8000 records, 255 fields and 16 subsets. Pull down help screens. Various screen modes. Extensive single or multiple criteria searches, sorts and maths facilities. Restructuring records is easy. Imports data from Viewstore, Betabase, InterBase, Mini-Office, etc.

ACCOUNTS

System Delta Business Accounts £69.95 each module Order Processing/Invoicing, Sales Ledger, Stock Management, Purchase Ledger, Nominal Ledger
The only flexible accounting suite. Use modules separately or integrate. Contains many features not found on other micros including definable invoice layouts, varied discount structures for invoice, archive mail order customers on one future mailshots, add new credit account at time of invoicing, selection of aged debtors/creditors or statements by various criteria, generates purchase orders, suggests stock levels, determines most profitable stock items, stock and sales graphs, numerous user-definable nominal accounts with unlimited bank accounts, output to a spreadsheet.

SPECIALIST APPLICATIONS

Flexible specialist software available for School Administrator, Video Rental, Newsagent, Hotelier (Genealogy, Timetabling coming early 1988)

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Minotaur Game £14.95
3D maze game. Fast reactions not needed. Create maze to your own size. Survive to rescue the men and kill the Minotaur.

Send for full brochure including other products

BBC MICRO

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Still the most comprehensive and flexible data management system on the BBC. 8160 records, 255 fields, 8000 characters per record. 8 subjects. Up to 5 files open at any time. Find any record in 3 seconds. Extensive single or multiple criteria searches, sorts and maths facilities. Multiple print formats. Default card. Card copier for transfer between files. Fully programmable relational system with over 150 commands available.

Mailshot, Reporter and Inter/View Link £19.95 each
Three versatile support programs for use with all System Delta files. Mailshot produces up to 4 across labels and links with wordprocessors for mail-merged documents. Reporter produces simple lists as well as fully definable reports including negative or positive columns, averages, totals, headings, sub and sub-sub-totals. Inter/View Link transfers data directly or as a result of any calculation including sum, average, count, etc.

System Delta Personal Accountant £45.95 (Nominal £55.95)
Five comprehensive accounting modules for use separately or as integrated suite. Many advanced features as listed above. Total flexibility allows customisation if required.

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Comprehensive management programs for Hotelier, Video Rental and Newsagent.

System Gamma £49.95
The first Graphics Management System. Anyone can produce stunning graphics and charts easily from the menu driven GammaPlot supplied. Multiple charts on screen at any one time and in any position desired. On screen text editorial. Several fonts provided for variable text. Statistical analysis. Macro facility. Entry by keyboard or System Delta files. Fully programmable to create your own graphics programs.

School Administrator £69.95
Pupil and staff records allow extra fields to be added if desired. Entry reports for examination boards. Form 7 DES statistics, etc.

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NEWS beat

New look at images

WHAT is claimed to be the first printer driver for the BBC Micro to take advantage of the highest resolution capabilities of Epson-compatible printers has been released by Silicon Vision.

The standalone package is also claimed to produce near plotter quality when used in conjunction with the company's Realtime Solids Modeller package.

Known as Super-dump it can print hard copy at resolutions of 1920x1024 as opposed to the usual 640x256.

Silicon Vision (01-422 2274) says that the program does not use screen images directly but instead uses text files of VDU codes that represent the image to be printed.

Price £19.95.

First Word Plus for Archimedes

THE popular word processing package First Word Plus has been ported to the Archimedes by GST.

Acornsoft, which is marketing the package, says that the version for the Archimedes features a 60,000 word check-as-you-type spelling checker.

Full cut, paste, search and replace facilities are incorporated and the on-screen display is claimed to be wysiwyg.

Price £99 from Acornsoft (0223 214411).

CAD/CAM packages

TWO new CAD/CAM packages for the BBC Micro – Easicad and Easicam – have been released by Metrotec (091-236 2401).

The packages enable the user to produce 2D graphic drawings, then output the technical information to a lathe for the production of components.

Easicad is used to prepare technical drawings with hatching, dimensions and text. Other features include drawing of lines, arcs, circles, boxes and ellipses together with rotation, mirroring, blend, intersection, tangents, window, zoom, pan and grid.

The companion program – Easicam – uses the data from Easicad to produce a CNC part program which can be downloaded to a milling machine.

Metrotec claims that with Easicam it is possible to trace over the required shapes, set up the machine tooling, and cycle and identify shapes.

Part programs are automatically prepared and it is also possible to verify the cutter toolpath and simulate machine operations.

Price £275 each.

Blind computer consultant wins a top award

Away from computers, Julia Schofield and her husband enjoy sailing their motor cruiser on the Thames

THE work of blind computer consultant Dr Julia Schofield has been recognised with a prestigious Woman of the Year Award.

Dr Schofield, who is well known for her work using BBC Micros and Masters to help disabled people, received a sculpture and £1,000 for the most notable achievement by a blind or partially sighted person.

The judges said she was chosen "because of her keen interest in other handicapped people as well as her own remarkable career".

Only two days after the award, the latest adaptation for a BBC Master – an overbed computer trolly – left Julia Schofield Consultants in Surrey for the Royal Victoria Hospital in Belfast to help a young girl suffering from leukaemia.

The consultancy is also working with the Archimedes and has recently helped install six of the machines in a school for the visually handicapped. Voice synthesisers, large print, networking and colour printing were all required.

Among the latest work is a driving instruction interactive video system to work on the Archimedes.

Dr Schofield, who has also been called upon to offer her expertise in Australia, says that about a third of her consultacy's work at present is connected with BBC Micros.

Blind from birth, Dr Schofield became the first person with such a handicap to take a degree in computer science.

She went on to take up a research post at the National Physical Laboratory in Teddington where she led a team concerned with designing solutions to man/machine problems.

Caring computing

THE first issue of a publication intended to promote the effective use of computers in meeting special needs is now available.

Published by SNUG – the Special Needs User Group – Special Needs Computing is aimed at a wide range of readers, including teachers, doctors and probation officers.

SNUG, a non-profit making organisation, hopes to publish the magazine quarterly. Content includes news, reviews, letters and practical articles contributed by people who work with computers in a wide range of ways.

Membership of SNUG, which includes SNC, costs £4 per year – and written contributions are always welcome.

Further details are available from Jeff Hughes (0744 24608) or Peter Whitby (0744 23078).

Steve's back

YOU can't keep a good game down. At least that's the opinion of Blue Ribbon Software, which has re-released the Steve Davis snooker program for the BBC Micro.

Originally released on the CDS label, the game sold over 150,000 copies and was hailed as a breakthrough in computer programming.

Blue Ribbon Software (0302 21137) says that the simulation features a computer-play option, friction factor, spin control and a fast shot facility.

Price £4.99 on disc and £1.99 on cassette.

ARCHIMEDES & BBC SOFTWARE

INTER-**CHART**

A general purpose chart and graph plotting program that can display data in the most easily understood format—graphically.

While it integrates directly with other members of the 'INTER' family it can also accept data from ASCII files, produced by WORDWISE, VIEW and programming languages such as BASIC.

Supports line, and bar graphs, pie charts and also scatter graphs. These may be automatically scaling, or the user may view any portion of the scale so allowing 'zooming' into any area of interest.

Pie charts may have highlighted segments (pulled out) with the values optionally displayed as percentages.

All graph displays may have optional text headings or messages positioned anywhere on screen. These are saved with the graph and may be edited at any time.

Multiple graphs can be held in memory at the same time. Any number of graphs may be overlaid allowing easy comparisons etc. (Not applicable to pie charts.)

Graphs may be displayed in any BBC graphics mode. The colours of bars, lines, or segments may be altered from a simple table of colours. In addition special striped colour combinations and a variety of cross hatching styles are available for bar charts.

Where appropriate either axis may be displayed with a log or linear scale, and optional dotted graduation lines are available.

INTER-CHART has built in screen dump routines for EPSON matrix printers and compatibles. Other screen dump routines may be used from within (or external to) INTER-CHART for other printers or plotters.

BBC ROM—£32.00+VAT (£36.80 incl.)
Archimedes ROM £25+VAT (£28.75 incl.)

INTER-**WORD**

The ultimate word processor for the BBC Micro.

The most comprehensive WYSIWYG image of the final page showing at all times, page breaks, headings, footings, bold text, underlines etc, ensuring the page on screen looks as close as possible to the final printout.

Works in 40, 53, 80 or a special 106 column screen mode and offers super-fast scrolling in all modes, even sideways scrolling if necessary.

All margin and tab settings are controlled by rulers placed in the text. These may be altered by moving the cursor onto the ruler and simply dragging the required margin or tab to the new position. All text controlled by the ruler is instantly reformatted to the new settings.

Pull down menus may control nearly all operations—no complicated commands to remember. This ensures that it really is easy to use.

Printer control menu allows easy access to all printers' special effects and allows easy configuring to any printer. Printer codes may be saved and re-loaded—no need for special printer drivers.

A special multi-file mode enables very long documents to be generated, even to the size of a disc, yet enables simple movement to any page in the document.

File selector for all file operations. This enables fast and very simple file name selection when saving, loading etc.

Integrates directly with other members of the INTER family and with SPELLMASTER, the fastest and most flexible spelling checker available for the BBC.

BBC ROM £49+VAT (£56.35 incl.)
Archimedes ROM £39+VAT (£44.85 incl.)

INTER-**SHEET**

A simple to use, but very powerful spreadsheet program offering many unique features.

The fastest spreadsheet available for the BBC Micro.

The largest capacity spreadsheet. This means more data and larger spreadsheets are possible.

40, 80 and a special 106 column screen mode. Especially useful for viewing large sheets.

Multiple spreadsheets in memory at once. Data from one may be included in the calculations of other sheets.

Super-fast replication allows anything from a single box to an area of the sheet to be copied to any other position. Formulae may be automatically updated relative to their new positions.

Simple WORDWISE like cursor movement.

A unique windowing system enables any row or column to be fixed on screen, while allowing the sheet to scroll underneath. Simpler than other windowing systems yet more flexible.

While it integrates directly with INTER-WORD it can also transfer data to and from other word processors such as VIEW and WORDWISE.

A large range of standard maths functions is included in addition to special spreadsheet functions such as AVERAGE, COUNT, IF . . ., LOOKUP, MAX, MIN, SUM etc.

Simple auto-prompting commands structure. If you can't remember the complete command syntax, just enter the first letter and INTER-SHEET will prompt from then on.

BBC ROM (2 chips) £49+VAT (£56.35 incl.)
Archimedes ROM £39+VAT (£44.85 incl.)

All the above ROMs are fully compatible with DFS, ADFS, Econet, all BBC machine variants and Watford or Aries shadow RAM boards.

MEGA 3

MEGA 3— the single chip solution

A new single 1 megabit chip containing complete versions of all the above programs is now available. This replaces 4 chips and so offers a more compact and more economic way of obtaining the above three programs.

BBC ROM £85+VAT (£97.75 incl.)
Archimedes ROM not yet available.

ACCESS & BARCLAYCARD ACCEPTED

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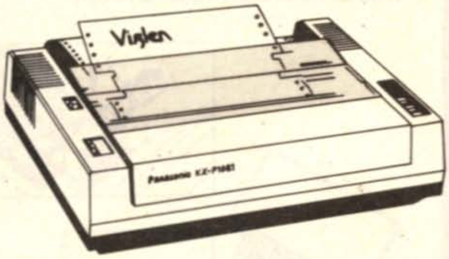
SPECIAL OFFERS FROM VIGLEN

PANASONIC PRINTER KIT



The Panasonic KX-P1081 come complete with £45.00 worth of accessories FREE including tractor feed and roll feed units with paper, printer cable, and a specially designed metal printer stand. Features include:

- ★ 120 cps draft printing 24 cps NLQ
- ★ IBM and Epson compatibility through dip switch settings
- ★ Prints 80 coloumns on A4 cut sheets, continuous stationery or roll paper 9 × 9 draft and 18 × 23 NLQ

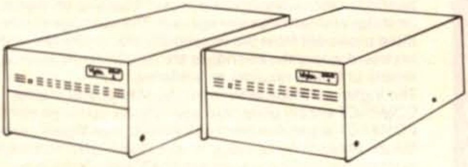
Stock Code	Description	Price inc. VAT
SP079	Panasonic KX-P1081 plus accessories	£185.95

Please add £8 for insured courier delivery.

WINCHESTER

MEGA BYTES FOR MINI BUCKS

NEW LOW PRICES



Plug in 20 to 112 Megabytes of extra storage with the Viglen Winchester system.

The Viglen Winchester is ready to plug in and use on a BBC Master micro; for a BBC B or B plus you will merely need to fit the Acorn ADFS Rom. The Winchesters are 100% compatible with the Acorn Winchester and Acorn ADFS and will also work with the Acorn Master 512 board with DOS plus.

Drive 1 Winchesters are also available for backup or just more storage and simply plug into the back of the Drive 0 unit.

The Winchester package consists of: Winchester unit (cased with controller boards, power supply and fan), Master reference Manual part 1, Winchester user guide and Winchester utilities on disk (such as formatter, verifier, ADFS menu and sophisticated backup program allowing you to make fast backups on DFS disks, ADFS disks or Drive 1 Winchester).

Stock Code	Description	Price inc. VAT
Drive 0 Single		
SP0150	VB20 20Meg Viglen Winchester	£499.00
SP0152	VB28 28Meg Viglen Winchester	£519.00
V155	VB40 40Meg Viglen Winchester	£799.00
V156	VB56 56Meg Viglen Winchester	£899.00
Drive 1 Second Drive		
SP0160	VB120 20Meg Drive 1 Winchester	£479.00
SP0162	VB128 28Meg Drive 1 Winchester	£499.00
V165	VB140 40Meg Drive 1 Winchester	£739.00
V167	VB156 56Meg Drive 1 Winchester	£769.00
V157	20MB Tape Streamer Backup	£689.00
V503	Acorn ADFS Rom and Manual (Only necessary for BBC B or B Plus)	£29.95

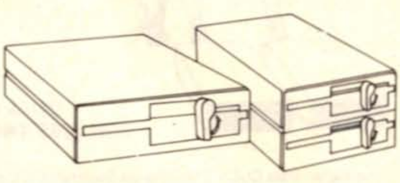
Please add £8 for insured courier delivery.

Available for use with SJ research file server at no extra cost, please specify when ordering.

DISK DRIVES

FROM £99.95 inc. VAT

The finest Japanese disk drives (not Taiwanese immitations) available at the lowest prices.



All disc drives are supplied with a manual, packed utilities disc and a full 12 Months warranty (2 Year Warranty available) and are ready to plug in and use on a BBc B (fitted with a DFS) B + or Master micro. 40/48 Track drives have a switch which enables operation in either 40 or 80 track mode.

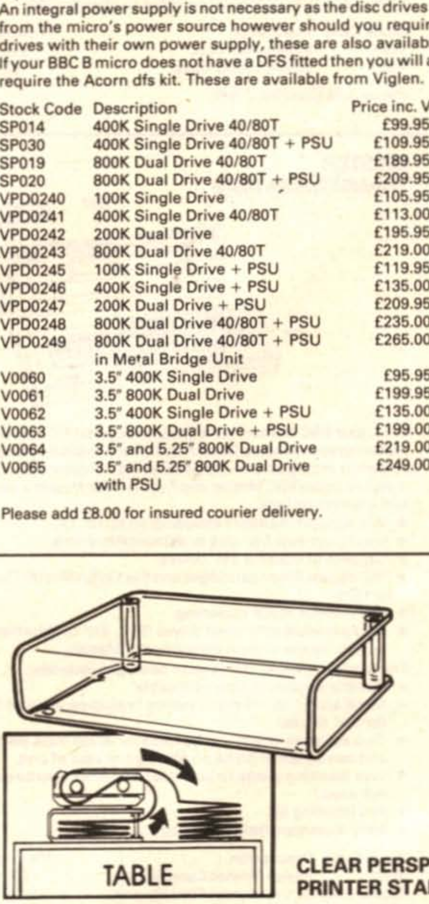
The capacity quoted are given in single density mode; for double density mode (1770 DFS + ADFS as in the Master) the capacities should be approximately doubled.

An integral power supply is not necessary as the disc drives run from the micro's power source however should you require drives with their own power supply, these are also available. If your BBC B micro does not have a DFS fitted then you will also require the Acorn dfs kit. These are available from Viglen.

Stock Code	Description	Price inc. VAT
SP014	400K Single Drive 40/80T	£99.95
SP030	400K Single Drive 40/80T + PSU	£109.95
SP019	800K Dual Drive 40/80T	£189.95
SP020	800K Dual Drive 40/80T + PSU	£209.95
VPD0240	100K Single Drive	£105.95
VPD0241	400K Single Drive 40/80T	£113.00
VPD0242	200K Dual Drive	£195.95
VPD0243	800K Dual Drive 40/80T	£219.00
VPD0245	100K Single Drive + PSU	£119.95
VPD0246	400K Single Drive + PSU	£135.00
VPD0247	200K Dual Drive + PSU	£209.95
VPD0248	800K Dual Drive 40/80T + PSU	£235.00
VPD0249	800K Dual Drive 40/80T + PSU in Metal Bridge Unit	£265.00
V0060	3.5" 400K Single Drive	£95.95
V0061	3.5" 800K Dual Drive	£199.95
V0062	3.5" 400K Single Drive + PSU	£135.00
V0063	3.5" 800K Dual Drive + PSU	£199.00
V0064	3.5" and 5.25" 800K Dual Drive	£219.00
V0065	3.5" and 5.25" 800K Dual Drive with PSU	£249.00

Please add £8.00 for insured courier delivery.

PRINTER STANDS



CLEAR PERSPEX PRINTER STAND

The Viglen printer stands are beautifully finished in clear perspex and raise the printer high enough to put continuous stationary underneath.

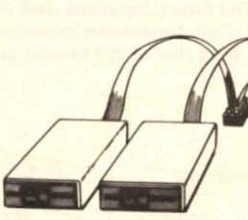
Stock Code	Description	Price inc. VAT
V490	80 Column Printer Stand (15" × 13" × 3.5")	£19.95
V491	136 Column Printer Stand (23.5" × 13" × 3.5")	£29.95

Please add £3 P & P

ORDER FORM ON LAST PAGE OF VIGLEN SECTION

SPECIAL OFFERS FROM VIGLEN

DUCKS



DUAL DRIVES FOR LESS THAN £17!

The Viglen Data DUCK (Dualling Up Connector Kit) converts any two single drives to a dual drive instantly. Simply plug the duck into the micro's disk drive socket and plug two single drives (any type and any make) into the duck to obtain a dual drive system accessed as drive 0 (and 2 if double sided) and drive 1 (and 3 if double sided). If neither single drive has its own power supply then you will require a Viglen power DUCK in order to obtain two disk drive power sockets from the micro.

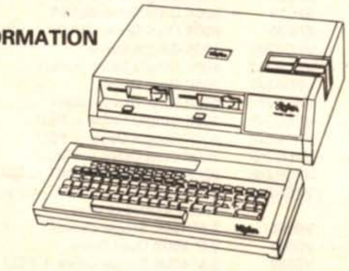
- ★ No soldering simply plugs in.
- ★ No need to take disk drives apart to change links.

Stock Code	Description	Price inc. VAT
V084	Viglen data duck	£16.95
V085	Viglen power duck	£7.95

Please add £2.50 for P & P.

CONSOLE SYSTEM

MASTER TRANSFORMATION



Give your BBC Master micro the professional PC look by replacing your existing lid with this smartly styled package. The system is strong and constructed in high impact ABS colour matched to the BBC Master and it gives your Master a very neat and impressive look.

- ★ Will support monitors including up to 16" TV.
- ★ Can house two 5¼" disk or Winchester drives.
- ★ Capable of housing 3½" drives.
- ★ Will accept Acorn cartridges and the Viglen Master Cartridge system.
- ★ Full internal metal screening.
- ★ Also available with fitted drives (5¼", 3½" or Winchester) or as a complete system including the Master.

The Master console unit system packages includes:

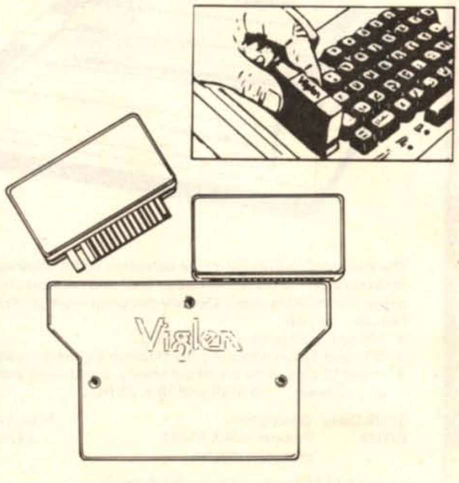
- ★ Remote Keyboard case with cable.
- ★ Metal screened main unit casing (including internal fittings for 5¼" drives).
- ★ Two switches which can be used for 40/80 track switching and can be either fitted on the front or rear of unit.
- ★ Two blanking plates to blank out any drive aperture that is not used.
- ★ Full labelling kit.
- ★ Fully illustrated fitting instructions.

Stock Code	Description	Price inc. VAT
V861	Viglen Master Console unit	£59.95
Accessories for the Master Console unit		
V853	Dual Drive data cable for console unit	£9.95
V854	Dual Drive power cable for console unit	£7.95
V855	Power supply for the console unit	£34.95
V866	Fan Kit for console unit	£34.95
V858	Fitting bracket for 3½" drive	£8.95
V851	Viglen Professional Console Unit for the BBC micro	£49.95
	Fitting service available from	£15.00

Please add £8 for insured courier delivery.

CARTRIDGE SYSTEM

VIGLEN ROM CARTRIDGE SYSTEM



Having fitted the Viglen Rom cartridge system to your BBC, Master or Master COMPACT, you can plug in your Roms/Eproms simply by inserting each one in a Viglen cartridge and plugging in whichever cartridge you want to use. The same Viglen cartridge can be used on all the micros mentioned and there is no need to switch the micro on and off between cartridge changes.

The Viglen cartridge system for the BBC micro consists of the cartridge cable assembly and socket, blanking off plates, 1 cartridge and cartridge storage rack. The cartridge socket when fitted protrudes from the rectangular slot on the left of the keyboard where the cartridges are subsequently inserted. It is simple to fit and requires no soldering.

The Viglen cartridge system for the Master and Master COMPACT simply plugs into your Master cartridge slot (or COMPACT expansion port) and accepts two Viglen cartridges. On the Master you can plug in up to two Viglen cartridge systems thus giving you access to 4 Viglen Cartridges simultaneously. The system comes complete with 2 cartridges and cartridge storage rack. On the Master you can also use Viglen cartridges which have 32 and 64K paged Roms inserted.

Stock Code	Description	Price inc. VAT
V560	Viglen Rom cartridge system for BBC	£12.95
V559	Viglen Rom cartridge system for BBC (low profile)	£12.95
V550	Viglen Rom cartridge system for Master	£14.95
V551	Viglen Rom cartridge system for COMPACT	£14.95
V561	Single Viglen cartridge	£3.45

Please add £2.50 P & P (£00.50 for single cartridge).

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TELETEXT ADAPTER

Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!

The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.

The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.

With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:

- Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
- Simply plugs into the user port.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
- Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
- FREE Telesoftware, no access charges (updated weekly).
- Save selected pages to disc/tape for later retrieval.
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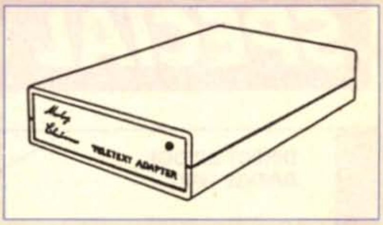
- Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
- Easy to follow comprehensive user guides.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).



WHAT THE REVIEWERS SAID:

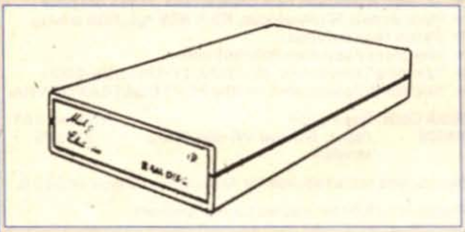
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*

". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*

". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*

THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

RAMDISC



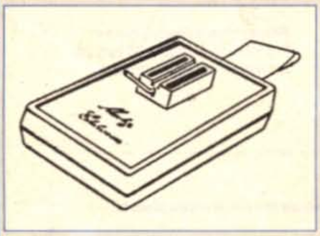
Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:

One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.

Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.

This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE

The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.

Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications.

These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.

These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.

QUADS–also available quad cartridges, specifications as Duels but 4x16k ROM's.

MASTER SMART CARTRIDGE

This device was designed and manufactured jointly by Morley and Care Electronics.

The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.

The **Smart** cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)

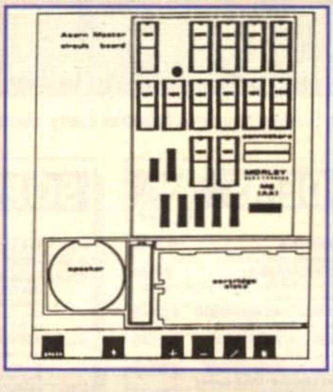
Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

NEW PRODUCT

MORLEY MASTER BOARD 'AA'

MORLEY ELECTRONICS



At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

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TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

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***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/ MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

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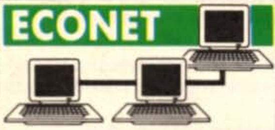

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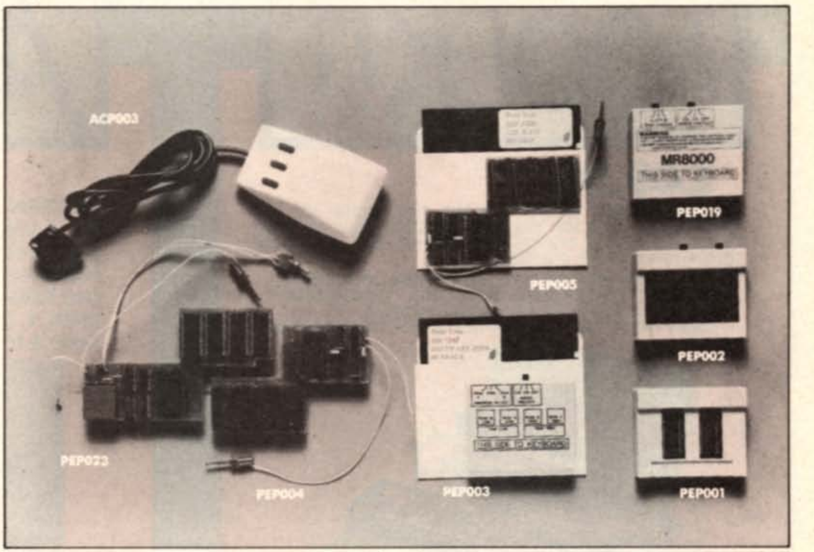

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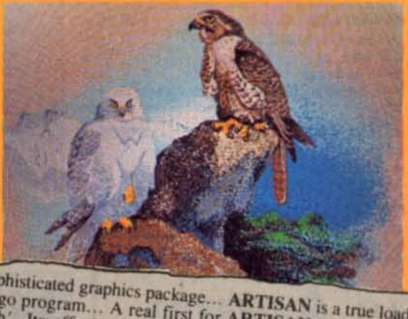

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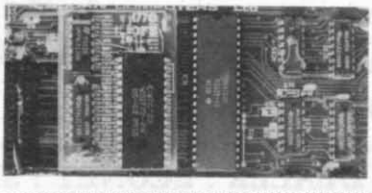

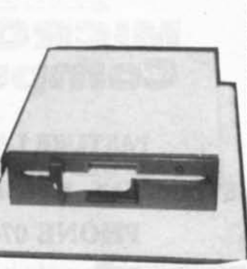

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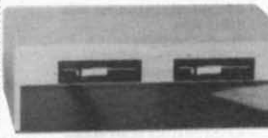

DFS ROM

DFS ROMS:
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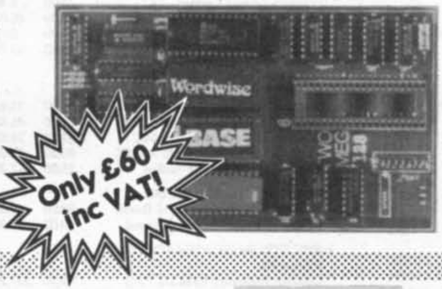

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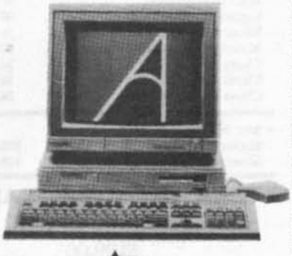

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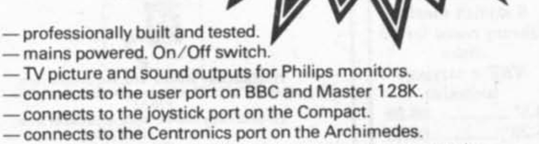

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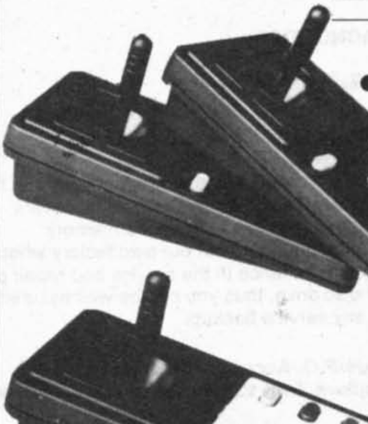

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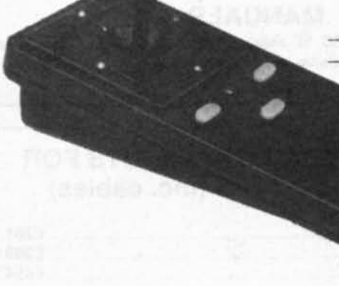

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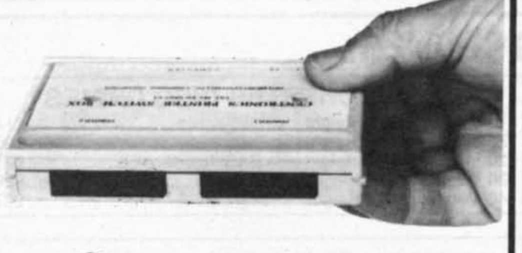

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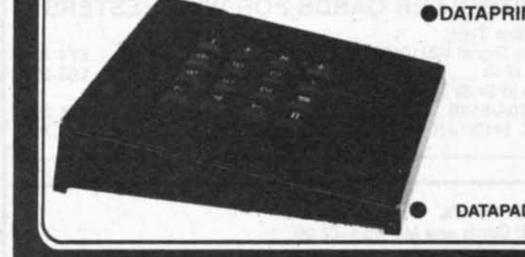

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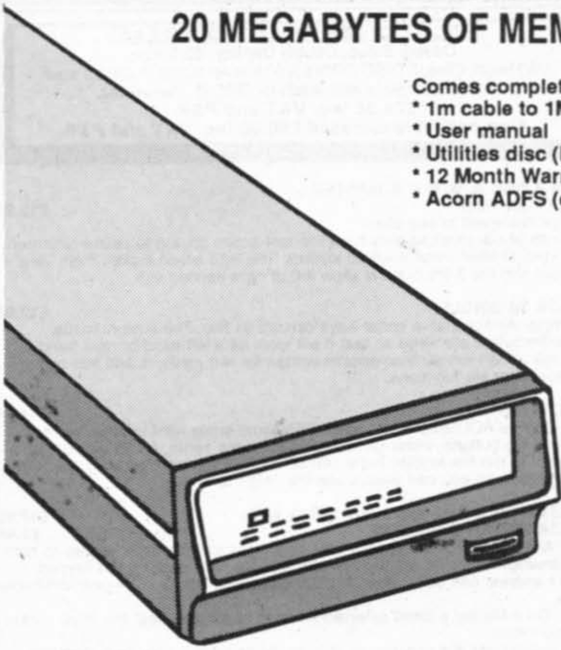

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SOFTWARE SCENE

BISMARCK – DEATH of a BATTLESHIP ... strategic war simulation

Price: £14.95 (disc)
Supplier: BBC Soft, PO Box 234, London SE1 3TH.
Tel: 01-576 0548

I HAVE never been a great lover of wargames which involve working out tactics, moving forces around a map and trying to out-think your opposition. I usually prefer games full of excitement and action. But Bismarck – Death of a Battleship has opened my eyes to a different style of game.

The aim is simple, though achieving it is anything but. You are Commander-in-Chief of the Allied Forces and you must seek out and destroy the German battleship Bismarck while ensuring that five large convoys making their way slowly across the Atlantic are adequately protected.

You have at your disposal six battleships, two aircraft carriers, 14 cruisers, four destroyer flotillas, two submarine packs, five bomber squadrons and three reconnaissance planes. All this against one battleship, a heavy cruiser, three submarines and three tankers. You'd think it would be easy, but it isn't.

For a start, you have a very large area of the North Atlantic to cover, and the convoys you're protecting are spread all over the place and can be attacked at any time.

Also the Bismarck and its companion – the heavy cruiser Prinz Eugen – are fast, have excellent radar and are very good at avoiding the many ships and planes you may have out searching for them.

Add to that the fact that the combined fire-power of the two German ships is very strong and you begin to realise that it's not just a case of finding them – you must have sufficient strength in the area to engage them in battle. Mistakes are punished by the loss of your ships.

On booting up the disc you are given the option of loading a saved game or starting a new one. You can then opt for the one or two-player game.

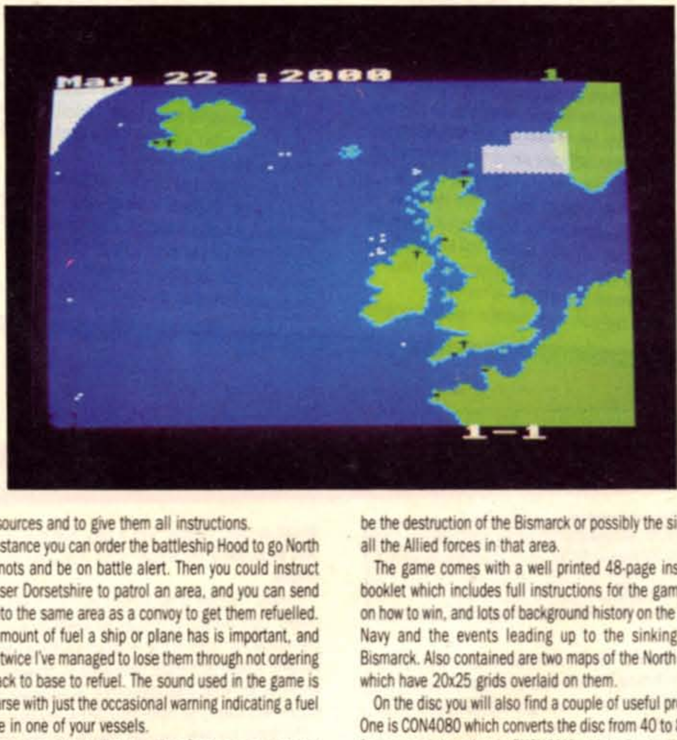
In the two-player version, one controls the German ships, but the game is basically the same. The German ships are out to sink as many convoys as possible and then reach the safety of port – in this case Brest.

You can now decide what skill level to play at – level one is easiest, level five hardest. You can also specify how many moves you wish the game to last – between 20 and 99.

The victory conditions can also be selected at this point. Sinking enemy ships and safely escorting convoys earn you points. You can either opt for victory to be decided on points or whether the Bismarck is sunk.

One of the nice things I found was the fact that if you get bored with the original scenario there is an alternative which is harder to play and involves more German shipping.

The game mechanics are complicated at first but you soon get used to how to play. I found it best to concentrate on using the A key which allows you to review the status of all your resources and to give them all instructions.



For instance you can order the battleship Hood to go North at 25 knots and be on battle alert. Then you could instruct the cruiser Dorsetshire to patrol an area, and you can send ships into the same area as a convoy to get them refuelled.

The amount of fuel a ship or plane has is important, and once or twice I've managed to lose them through not ordering them back to base to refuel. The sound used in the game is very sparse with just the occasional warning indicating a fuel shortage in one of your vessels.

Once you have given all your orders for the move, you can enter the Projected Mode, which shows you the position of all your ships and planes together with where they will be after carrying out the orders you have given them. This is handy, as it allows you to change the orders if the ships aren't going quite where you intended.

The ideal situation is to get lots of your ships into the same area as the Bismarck – not an easy task. If you manage it you have a choice to make. You can engage the Bismarck, which is unwise unless you have several ships in the area, or you can decide to shadow her, which gives you a better chance of bringing in other ships later because you know where she is. Or you could withdraw or ignore her.

Once you have decided to engage, the battle starts and all you can do is sit back and wait for news. At this point it's out of your hands and the conflict could go on for quite a while. Occasionally, however, radio contact with your forces may be established for a few seconds and during this period you can change your orders.

Eventually the final report will come in: The outcome could be the destruction of the Bismarck or possibly the sinking of all the Allied forces in that area.

The game comes with a well printed 48-page instruction booklet which includes full instructions for the game, hints on how to win, and lots of background history on the German Navy and the events leading up to the sinking of the Bismarck. Also contained are two maps of the North Atlantic which have 20x25 grids overlaid on them.

On the disc you will also find a couple of useful programs: One is CON4080 which converts the disc from 40 to 80 track format, and the other is SHOWMAP which simply displays a map of the North Atlantic on the screen. This, too, is overlaid by the 20x25 grid and you can print it if you have a screen dump routine.

After playing Bismarck for a while it began to dawn on me that I was really enjoying myself. It's addictive.

The first time I succeeded in sinking the Bismarck I wasted no time in trying out the alternative scenario.

It just goes to prove that games don't have to involve complicated mazes or stunning graphics to be enjoyable. Bismarck is a definite must for those of you who like wargames, but I also think that quite a few others will be pleasantly surprised at this fascinating game.

Desmond

Sound	*6*
Graphics	*8*
Playability	*9*
Value For Money	*8*
Overall	*9*

SOFTWARE SCENE

TUTANKHAMUN'S REVENGE ... Egyptian adventure

Price: £7.95 (disc)
Supplier: Bug-Byte, Victory House, Leicester Place, London WC2H 7NB.
Tel: 01-439 0666

IN order to protect their wondrous treasures from the unwelcome attentions of grave robbers, it was customary for the Pharaohs to put a curse on the entrance to their tomb. Convincing yourself that it's just a load of superstitious rubbish, you prepare to enter Tutankhamun's tomb. Will you return a millionaire? Will you return at all?

The treasures for which you search are cleverly disguised as golden keys and there can be up to four in any one room. You are allowed to wander relatively freely through the tomb and there's no need to collect every key in a room before you move on to the next. In fact some rooms must be entered via two different doors if you are to collect all the treasure.

The instructions recommend that you map the tomb, as certain of the rooms operate a one way system on their exits: They will let you out, but you'll have to find a different way back in. The map is also useful when you want to return to the surface to deposit your treasure in the bank.

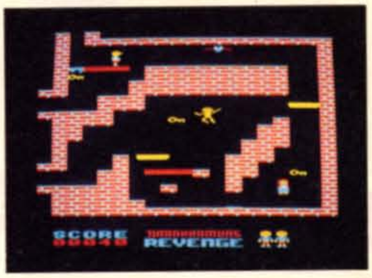
A total of five explorers are provided to help you complete your task. These are lost through contact with giant spiders that frequent most rooms, or by dropping them through a distance of greater than one brick. There is no time limit so you can sit and ponder a screen for as long as you wish before making a move.

The danger of death via gravity can give rise to certain dilemmas: Several of the exits present themselves as pits and unfortunately some prove bottomless. As a general rule the narrower exits are the genuine ones – but don't hold me to that.

The program comes with a Revenge Designer – three programs that can be used to create sprites and screens, and then put them all together as a complete game.

The screen utility allows the addition or removal of bricks, sprites, lifts, trapdoors, moving floors and treasure. Screens may be played or edited at any stage of development and this allows you to perfect a display before saving it to disc for inclusion in the finished game.

The character designer can be used to create new, or edit existing sprites. Characters are edited on a large grid and may contain up to four colours. The third program – the game designer – will load up to a maximum of 20 of your screens from disc in a pre-determined sequence.



As arcade adventures go, Tutankhamun's Revenge breaks no new ground. The graphics are only mediocre, with amateurish sprites patrolling around crude backdrops. Even the music is second rate – a laborious Egyptian dittie that is best turned off.

Carol Barrow

Sound	4
Graphics	6
Playability	6
Value for money	8
Overall	6

KINGDOM of HAMIL ... updated re-release

Price: £9.95 (40 track disc, BBC B, B+ and Master)
Supplier: Topologika, PO Box 39 Stilton, Peterborough PE7 3DL.
Tel: 0733 244682

I AM so pleased to see the re-release of several adventures that richly deserve the title *classic*. Kingdom of Hamil was first issued about four years ago, but has been virtually unobtainable for the past two.

Topologika presents its adventures in excellent packaging, and there's a helpful booklet by Peter (Philosopher's Quest) Killworth on how to play adventure games which will prove invaluable for beginners. A cleverly designed hint sheet works in conjunction with the Help feature on the disc.

If after that you are still unable to proceed, write to Topologika enclosing a SAE and you will receive a personal reply.

You will find dire warning about attempting to copy the original disc but get clear step-by-step instructions on preparing a disc to play from.

"Hamil is a land of sorcery and romance, a place of strange but loyal beings, of immense fountains, with a castle and a museum full of bizarre antiquities which only the king can put to use..." runs the opening, and the game does not disappoint.

To put you in the picture: You are the true, but dispossessed king. Once kidnapped in infancy, you now set about to reclaim your throne.

The opening descriptions are in elegant prose which is a delight to read, together with a clear hint that you should start by exploring the chapel rather than attempting to do outside.

It reads: "You are at the western end of a primitive stone chapel. Light streams in through the windows which are set high above your reach in the entirely featureless walls of the building. A plain arch leads northwards to the world outside which, as you know from experience, is extremely hostile". Anyone who tries to go north after that is just plain daft.

The parser has been updated from the original release to permit the input of the *Take everything* variety, together with exceptions and exclusions. *Examine* is redundant, since the location descriptions contain all the information that an adventurer needs.

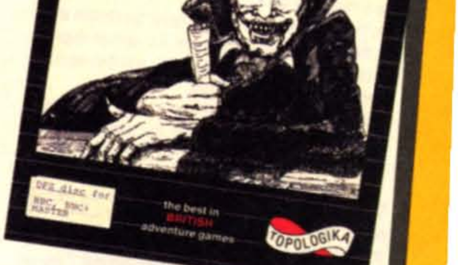
The first puzzle – how to leave the chapel – is straightforward, and the next teaser involves a little decoding to obtain the password to enter the next chaining puzzle which also involves a vampire.

As is to be expected from here on the complexity escalates with the first maze manifesting itself to the thunderous noise of rock slides. I am not a noted fan of mazes, but the one here which contains the hungry T. Rex certainly kept my adrenalin flowing.

Making a careful map of this game is essential, and you can expect to expire frequently at various points in your quest. Luckily there is a Save facility.

I was delighted to see this package and recommend it unreservedly. Master owners please note that it is compatible.

Mad Hatter



Sound	N/A
Graphics	N/A
Playability	9
Value for money	9
Overall	9

CHART CHALLENGE '88 ... demanding musical teasers

Price: £9.95 (disc)
Supplier: Outlook Enterprises, 86 Glenmore, Clayton-le-Woods, Chorley, Lancashire PR6 7TB.
Tel: 0772 34894

IN the January 1987 issue of *The Micro User* I reviewed the original Chart Challenge program and hailed it as being a must for the music buff. A year has passed since then, and Steve Close has not been idle. Spurred on by his original success, he has written the new, improved, Chart Challenge '88.

The original program consisted of a group of four quiz-orientated games that could be played in any order. They loaded their data from a total of eight 40 track data discs which spanned the years 1952 to 1985.

The 40 track version of Chart Challenge '88 is supplied on a single, reversible floppy disc. This reduction in database size has been achieved by axeing the album titles and song lyrics featured in the original game.

The new Challenge is eminently more playable than its predecessor. Under the new format, your musical knowledge is pushed to the limit in seven rounds. Your score is kept as a running total and is stored on disc when you complete the final section.

Options is a multiple choice, question and answer game. A question – relating to your chosen decade – is displayed on the screen with two answers below it. Select correctly and you move on to the next question.

This continues, with an increasing number of possible answers, until you answer incorrectly or the time limit expires. A much improved **Hangman** program constitutes round two, and here you have to guess both the single and the artist before the time limit expires and you get another go.

Link Lines begins with a 3x3 grid of coloured squares, with each colour representing a different era. Your task is to answer three questions in a line, either vertically, horizontally or diagonally. Success is rewarded with a new grid of increased dimensions.

Matching song titles to their artists, years released or highest chart position is the objective of **Connections**. As with all of the other games, the round ends with the first incorrect answer.

A ladder is used to chart your progress in round five – **True or False**. By giving the correct response to a displayed statement, you are moved one rung up the ladder while the first wrong answer moves you down by one rung, a second failure by two rungs, and so on.

As its name suggests, **Gold Run** bears more than a passing resemblance to a popular TV quiz game. The screen is filled with 20 hexagonal tiles each containing the initial letters of a song title. When you select a hexagon you are given the title, but with one word omitted – enter this to win the tile. To complete the round you must cross the screen from left to right before the time limit expires.

Options returns in round seven, but this time you can specify the number of answers that you want displayed.

The original Chart Challenge was good, and the 1988 version is magnificent, I guess I'll run out of superlatives in 1989.

Carol Barrow

CHART CHALLENGE
'88
POP QUIZ

Sound	
Graphics	***N/A***
Playability	***9***
Value for money	***10***
Overall	***10***
	9

CYBOTO ... another maze game

Price: £9.95 (cassette) £11.95 (5.25in disc) £14.95 (3.5in disc)
Supplier: Go-Dax, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire RG7 4AA.
Tel: 0734 302600

CYBOTO, the latest offering from Go-Dax, is a mixture of Repton and Gauntlet but lacks the variety and originality of either. You are at the heart of a futuristic maze playing the part of Cyboto – the last of the cyborgs. The title screen offers two options in addition to playing the game. The first, Info, displays five geometric snowflakes – four are enemy androids that should be avoided and the fifth, a Pod, represents treasure that you collect.

Option two is your gateway to the higher levels. Every maze has a name, and by entering it as a password you can start from the highest level reached so far.

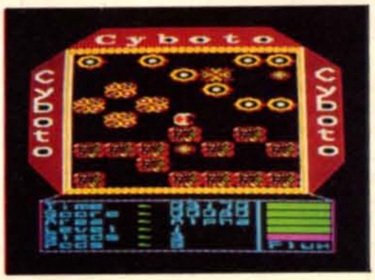
Each maze contains 10 pods and a running total of the number collected is displayed at all times. The first few pods are unguarded and easy to find, but the last couple are hidden down convoluted corridors and guarded by droids. You've got problems. As soon as the final pod is in your grasp you are teleported to the next – infinitely more fiendish – maze. Halfway through level one I was experiencing difficulties: Some of the pods were situated at the bottom of mined cul-de-sacs with no safe path through.

Cyboto didn't appear to have any offensive capabilities, just movement in the four compass directions. A thorough exploration of the keyboard revealed not only Cyboto's force shield, but also a map of the whole maze, complete with the pod positions.

The shield is activated by holding down Shift and power is represented by five horizontal bars at the bottom of the screen. These shrink when the shield is on and recharge slowly when it is not in use. Walk through an android with your shields up and he vaporises instantly – once zapped they do not reappear.

Apart from death by droid, you may also lose a life by taking too long to complete the maze. A time limit of 7000 units begins to tick away as soon as you start and the speed of tick increases tremendously when you take a look at the map, so use this facility sparingly. Rather sneakily the programmers have rendered the pause option inoperative while you're using the map screen.

The mazes are a similar size to those used in Repton but are not bounded by solid walls – if you walk far enough in one direction you will eventually return to your starting point. The game lacks a puzzle element like the precariously-balanced boulders in Repton.



Cyboto has all the makings of a good maze game, but it needs some kind of gimmick if it is to sell well in this very competitive area of the games market.

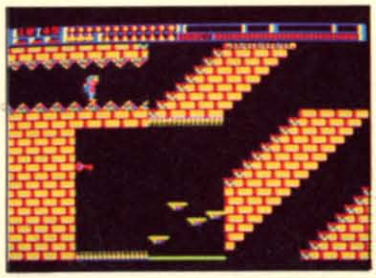
James Riddell

Sound	***6***
Graphics	***7***
Playability	***7***
Value for money	***7***
Overall	***7***

SOFTWARE SCENE

QUEST . . . underground adventure

Price: £9.95 (cassette), £11.95 (5.25in disc), £14.95 (3.5in disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453



WALTER Cobra – amateur inventor and part-time adventurer – has discovered an ancient map, the contents of which reveal the location of a fabulous treasure known as The Golden Dragon. So eager is he to begin his quest that he enters the labyrinth without the map – and now, hopelessly lost, he desperately needs your help to explore the caverns and locate the treasure.

Absentminded he may be, but at least he remembered to pack the rest of his adventuring gear – eight stun grenades and a pair of anti-gravity boots. The function of the stun grenades is twofold – they will immobilise the majority of the robotic guards that you'll encounter, and they're also very effective at demolishing nuclear reactors of which the labyrinth contains three.

The playing area is laid out in grid fashion. This is eight screens wide, but I am unsure as yet of its vertical extent. The designs are many and varied, but they are all immaculately drawn and cleverly constructed – each one creating the maximum difficulty with the minimum of effort.

Merely recovering some golden relic would be far too easy a task for an adventurer of your calibre, so Superior decided to complicate matters. In addition to the Golden Dragon, you must collect 12 power crystals, destroy three reactors, interrogate eight computer terminals, and solve a series of puzzles in the special rooms.

There is often more than one exit from a screen, and consequently more than one route through the labyrinth – but only one is correct. You will soon discover that many of the paths are barred by locked doors – a symbol displayed beneath the door can be used to help identify the relevant key.

Walter's mode of transport is determined by the properties of the current room. His jet boots are only operative when there is a large triangular shape present, otherwise he is restricted to running and jumping. It is useful to remember that the left and right keys remain operative when falling, thus allowing you to control Walter's drift during his descent.

The alien inhabitants of the labyrinth display varying degrees of aggression. Some will go about their own business, ignoring your presence, and the rest are just downright nasty. You are unlikely to outrun such an alien in a horizontal plane, but the turbo boost button on your boots should enable you to escape vertically.

Stun grenades are only effective against mechanical adversaries. You are advised not to use them indiscriminately as a badly timed detonation can leave a concussed android blocking your exit. On the other hand I found that a robot, if halted in the correct position, could be used as a platform to gain extra height when jumping.

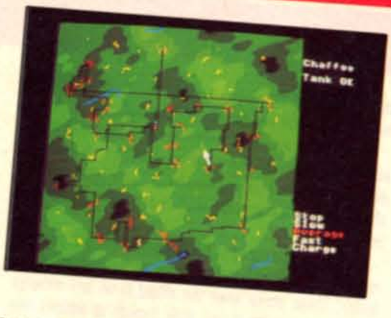
It is obvious that Superior's programmers have put a great deal of time and effort into creating Quest. It has the polished graphics of a first rate arcade game and the frustration factor of a top class adventure. What more can I say?

Jon Revis

Sound	*7*
Graphics	*9*
Playability	*9*
Value for money	*9*
Overall	*9*

CONQUEROR . . . 3D tank power

Price: £24.95
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453



IF there's one type of game I really don't like, it's a computer version of table-top wargames – all that map strategy just leaves me cold. What I want is a thinking man's shoot-em-up like Elite – and Conqueror fits that bill.

I was given a demo version to review and what I got lacked many of the refinements that the draft manual promised, but even so was highly addictive.

In Conqueror you are in command of one or more tanks on a battlefield against a set of micro-controlled opponents. Each battle level gives you greater numbers and more powerful tanks against increasingly menacing opponents with up to 15 tanks on each side.

In each game you can choose between either having American and British, German or Russian forces, against one of the other two. Each Power has four types of tank – one light, two medium and one heavy – all based on genuine Second World War machines.

But the key difference between Conqueror and any other similar game to date is that you play in real time on a three-dimensional scrolling landscape with trees, houses and rivers. Does that sound familiar? Well, this game – written by Jonathan Griffiths – uses David (Elite/Zarch) Braben's landscape drawing routines.

The first game is referred to as arcade and consists of a series of battles with your group of tanks against the computer-driven ones. The first combination at level zero is an American Chaffee – fast and light – against a Panzer III which is less powerful but the micro is a better shot. I found that driving round in circles with the turret facing in toward the enemy was the best tactic.

At all levels you can choose between manual or automatic tank strategy. In the former you control where the tanks on your side go; in the latter this is controlled by the micro, but you can override it.

Tactical control is via the map, you select a tank and click the position you want it to move to. However, on the ground the micro-controlled movement leaves a little to be desired and it is fairly common for tanks to either disable or even destroy themselves by running into objects. But for the most part they do manage to avoid these hazards and get on with the battle.

Water provides the greatest obstacle: I have yet to see a tank cross a river of its own accord.

For the more serious player there are the Attrition and Strategy games. In the first format you have a standard set of tanks – two light, two medium and a heavy – but the computer starts off with an inferior selection. In each successive battle the computer's selection becomes more and more potent.

Finally there is the Strategy game in which you can choose the tanks you require from a fixed budget, and the micro does likewise. When you win a battle the budget increases. Within this game there are other options such as use of spotter planes and artillery fire which can be bought at the cost of some tank power.

Lazarus

Sound	
Graphics	*6*
Playability	*9*
Value for money	*9*
Overall	*9*
	9

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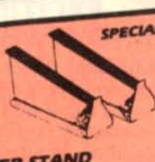

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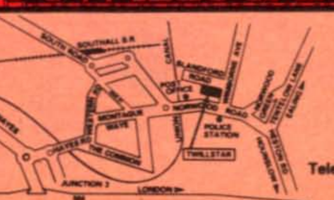

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Heavenly pastime

Bernard Mitchell helps you find your way round the sky

IF you want to emulate Patrick Moore using Mike Cook's theodolite and calculation program from our April issue, it will help if you first become familiar with the night sky. Now you can view it from the comfort of your own home with this program which projects the relative positions and shapes of 32 major constellations.

Enter the listing and ensure you've made no typing errors using Get it Right! When run, the program produces a map of the sky at night with individual stars presented at roughly the correct relative magnitudes.

The individual constellations – shown below – are named and highlighted in turn, and you can move to the next one by pressing the spacebar or just allowing the program to cycle through changing once every 10 seconds.

The compass points at the top, bottom and sides of the display refer to the direction of the horizon.

The view given is of the winter sky, although the majority of the constellations can be seen at all times of the year. It would be a fairly simple task to incorporate constellations that are only on view during summer with time/date and your position input to provide the correct display.

So now you can star gaze without getting cold.

Listing starts on Page 145.

Andromeda
Aries
Auriga
Bootes
Cancer
Canes Venatici
Canis Major
Canis Minor
Cassiopeia
Cepheus
Cetus
Coma Berenices
Corona
Crater
Draco
Eridanus
Gemini
Hydra
Leo
Leo Minor
Lynx
Monocerus
Orion
Perseus
Pleiades
Puppis
Pyxis
Sextans
Taurus
Ursa Major
Ursa Minor
Virgo

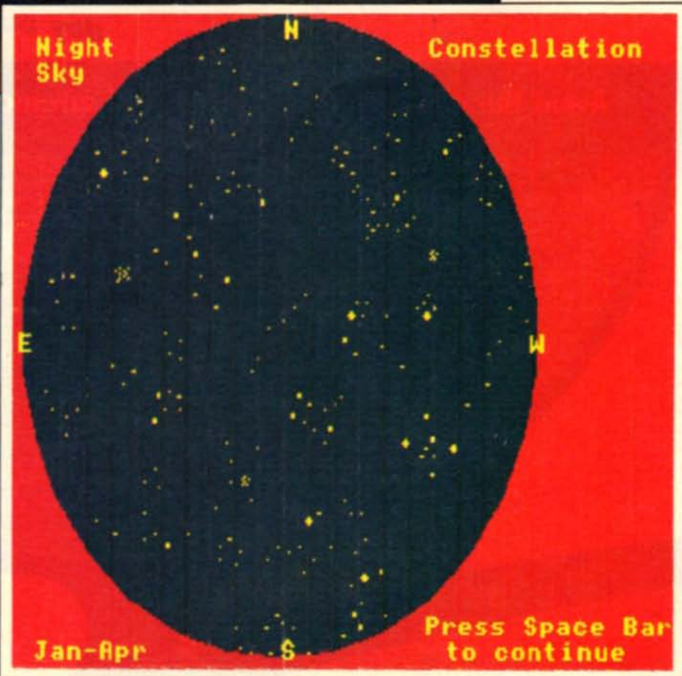
Constellations highlighted by the Night Sky program

PROCEDURES

delay	Wait for 10 seconds or until spacebar pressed
flash	Flash constellation and name on screen for 10 seconds
init	Initialise variables and draw main screen
name	Display constellation name on the screen
reloc	Move the program down in memory to allow use of Mode 1
t	Print a string at a graphics position

MAIN VARIABLES

A%-F%	Character definitions for six levels of star magnitudes
M%	Basic MOVE command coded as a single digit for use in VDU statement
N%	Number of constellations
A$()	Name of each constellation and appropriate function



```
Night                N                 Constellation
Sky

E                                                  W

                                       Press Space Bar
Jan-Apr              S                   to continue
```

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It's a challenge!

In the third part of this series Mike Cook offers his solution

OVER the last couple of months we have been outlining a problem for you to solve – together with some hints on how to go about writing a program to give the required answer.

I asked you to test out a roulette gambling strategy: To bet on the red numbers and, if you lost, to keep doubling the bet until you won. Many of you will have written your own routines to solve the puzzle, and mine is shown below. It follows the method described last month, but is just one of the infinite ways that you may have approached it.

If you've solved the problem in a completely different way we'd like to see it, so send it to Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP. We'll give £10 for the best solution that matches exactly the problem as it was defined in the March issue of The Micro User.

I HAVE kept the program to solve the gambling problem simple. When run, an evening at the roulette table just flies by. Line 60 defines how much money you have in your pot, with line 70 setting the size of the initial bet. If you like, you can put input statements in both those lines to vary the amounts when run. We can keep track of the largest bet we have placed with the variable *LBET*.

Next we read in all the red numbers from the DATA statements into the array *RED()*. The casino might close before we are through so the total number of spins of the wheel possible is tracked in the variable *TSP*. Similarly the number of spins actually used is recorded in *SPIN*. A logic variable *BUST* indicates if we have enough money to cover our bet and line 170 sets up the victory pot – the amount we have when we decide to give up for the night.

So now we enter the casino and start our first cycle of bets. Line 300 generates the random number as a result of spinning the roulette wheel. Lines 310 to 340 see if we have won and then we must take the appropriate action if we have won or lost. If we have won we add our winnings to our pot and end the current cycle of bet doubling. If we have lost we need to double our bet if we have enough money – if not we are bust.

Then if the casino is still open we can place our bet again. After a winning cycle of bets we decide whether to call it a night or carry on – this is done in line 430.

So there you have it: You can see whether you will win. I made an adjustment to the program to run it continuously – keeping a count of how many nights I won and lost – and I kept it going overnight. It only clocked up 3,115 wins and 2,674 losses after 10 hours so I transferred it to the Archimedes where in seven hours it clocked up 17,753 nights of victory and 14,326 nights of losing. This represents just over 87 years of gambling every night, with winnings of just under £4,000 a year.

However, before you rush off to win a fortune consider a few more points. First of all most casinos have house rules which limit the maximum and minimum bets and some tables limit the number of times you can double your bet. In addition you will have to subtract your entrance fee and any drinks you buy from your winnings. Some casinos might not get through as many as 200 spins a night, so you will have to change that.

Finally, it is rather a slow and boring way to make money. It's much better to hone your programming skill and make that pay. So are you ready for next month's Programmers' Challenge?

```
   10 MODE 7
   20 PRINTTAB(0,3);"Programmer's Challe
nge"
   30 PRINT"Number 1"
   40 PRINT"The ROULETTE Wheel"
   50 PRINT"By Mike Cook"
   60 POT=100
   70 FBET=1
   80 LBET=0
   90 REM NOW INITIALISE RED NUMBERS
  100 DIM RED(18)
  110 FOR A=1 TO 18
  120 READ RED(A)
  130 NEXT A
  140 DATA 15,4,2,17,6,13,11,8,10,24
  150 DATA 33,20,31,22,29,28,35,26
  160 VICP=POT*2
  170 TSP=200
  180 SPIN=0
  190 BUST=FALSE
  200 REM NOW TO ENTER THE CASINO
  210 REPEAT
  220 REM A NEW CYCLE OF BETS
  230 BET=FBET
  240 REPEAT
  250 SPIN=SPIN+1
  260 PRINTTAB(0,8);"SPIN Number ";SPIN
  270 PRINT"Bet is £";BET;SPC(3)
  280 IF BET > LBET THEN LBET=BET
  290 TSP=TSP-1
  300 S=RND(37)-1
  310 WIN=FALSE
  320 FOR A=1 TO 18
  330 IF S=RED(A) THEN WIN=TRUE
  340 NEXT A
  350 IF WIN=TRUE THEN PRINT" WIN " ELSE
 PRINT"LOSE"
  360 IF WIN=TRUE THEN POT=POT+(BET *2):
GOTO 400
  370 REM WE MUST HAVE LOST TO BE HERE
  380 BET=BET*2
  390 IF POT > BET THEN POT=POT-BET ELSE
 BUST=TRUE
  400 PRINT"You have £";POT;SPC(3)
  410 UNTIL(WIN OR BUST OR TSP=0)
  420 REM DO WE EMBARK ON ANOTHER ROUND?
  430 UNTIL BUST OR (POT>=VICP) OR (TSP=
0)
  440 PRINT"The largest bet placed was £
";LBET
  450 END
```

The myth maker

Geoff Larsen reveals the inspiration behind his top selling adventures

IN the February issue of *The Micro User* Peter Gerrard discussed the sources of inspiration for adventures and mentioned that a great many games obviously have their origins in books. I've written several adventures and although the written word is a good source perhaps the unwritten word is better.

The plot of the typical adventure can probably be condensed like this: You journey from A to B and bring back object C by vanquishing the evil tyrant D.

Stories from books can be altered to suit the scene set by the adventure. For instance, a novel set in wartime Germany in which the hero is fleeing from Nazi stormtroopers can look altogether unrecognisable if it is transferred to a fantasy land where the heroine is fleeing from a horde of evil orcs. Only the names are changed, and a discovered pistol merely becomes a discovered scimitar.

If I can be said to have a favourite writer then it would have to be James Joyce. His masterpieces are, however, probably impossible to transform into a plot for an adventure and I doubt whether even the Archimedes would be able to handle the vocabulary required for a game based on Finnegan's Wake. Therefore I have to look elsewhere for ideas.

For my follow up to Wychwood I chose to write a story which was inspired, in a way, by the folklore connected with the prehistoric sites so abundant in the West Country. I have long been interested by the great stone circles which still stand in many parts of the country, and a visit to the Rollright Stones on the Oxfordshire/Warwickshire border provided me with a legend on which I could build a fairy story of my own.

A legend common to many standing stones tells that they were once living human beings who have been turned to stone for some reason. The Rollright tale concerns an ambitious king who, marching north, met a witch who challenged him to take seven strides forward. If he could see the village of Long Compton then he would become King of England. However, a hillock prevented him from seeing the village, so the witch turned the king and his men into stone and herself into an elder tree.

It is said that Mother Shipton was the witch who challenged the king. She was a 16th century prophetess who, after her death, came to be known as a legendary witch. She was associated with Shipton-under-Wychwood about seven miles south of Rollright.

In The Nine Dancers the legend connected with the stone circle tells that a sorceress was outraged at not being invited to the wedding of a princess and a prince from a neighbouring kingdom. She turns the princess and a few others to stone.

When the prince hears of this he is heartbroken but a wizard informs him that one day she will be brought back to life. Turning the prince into stone to await that day the wizard transforms himself into a tree so that he may watch over the princess to ensure that no harm should befall her.

WRITING The Nine Dancers necessitated a great deal of research into the folklore surrounding the great standing stones and burial mound of the prehistoric Beaker People.

The first location in the game contains a signpost which points to Wychwood – seven miles distant. Near the end of the adventure the player climbs a hill to find a single standing stone – the prince. That stone would certainly be very similar to The King Stone at Rollright – pictured above.

The next adventure – The Puppet Man – was inspired by a single word, marionette. When I heard someone describing marionette shows I knew that it would make a nice backdrop for an adventure game. In that story – set at the end of the last century – it is rumoured that the marionettes belonging to a famous puppeteer are actually living creatures.

When the main one disappears the people are

satisfied that the rumour is true and that the creature has decided to leave. In a dream Mnemosyne, mother of the Muses, offers to help you find the puppet if you, in turn, will help some of her daughters – Terpsichore (dance), Thalia (comedy) and Erato (love poetry).

The adventure is full of pantomime and nursery rhyme characters including Harlequin, Columbine, Pierrot, the Butcher, the Baker and the Candlestick-maker.

Characters and situations from my earlier games metamorphose into others in later ones. Thus a white horse may become first a chalk hill figure and then an inn and next time the crest of a wave.

The theme of my latest adventure, Hex, concerns witchcraft in a Cornish village in the year 1902. Like all Larsoft games the story may be described as being moralistic – I like to provide a sting in the tail of each story. In The Nine Dancers the ending veers first one way and then another. In The Puppet Man you may wonder whether the marionette really is alive. And in Hex?

The most popular game to date is still Wychwood, possibly due to the wonderfully gloomy cover illustration drawn by Robin Challenger.

Once I get an idea for a story I spend a good few months researching reference books in order to acquire a solid framework around which to introduce the characters, objects and locations. Further research may show how I can incorporate ideas from previous Larsoft games as well.

The original idea is then developed into a story which can give birth to further ideas. From this mixture I will prepare the working story which is finally coded into the computer and realised as the working adventure.

Now, yet more changes may be made in order to make the game more presentable on the screen. Testing it may reveal untapped avenues which are then incorporated. Knowing the story is definitely a disadvantage when it comes to testing the game.

Those unfamiliar with the correct procedures may be side-tracked by things which I had not envisaged as being important. Therefore the comments made by those to whom I have sent my pre-production version of an adventure are most valuable and from their remarks I may change the emphasis from one location or object to another and add more messages.

Finally, the adventure is finished. From a single word or phrase like The Puppet-Man, or a childhood fantasy such as Hex, comes an adventure game. People seem to enjoy these non-violent escapades.

I AM thrilled to have been asked to write a fantasy for Robico. Its adventure games are the pinnacle of BBC Micro software and its prowess in programming means that I will not be restricted in the amount of text. I'm no programmer, and up till now have had to rely on Gilsoft's The Quill to write my adventures.

I always like to have the map of the landscape drawn out before I start to enter such things as the vocabulary or object descriptions into the computer. The adventure should have a solid and believable story before I even begin mapping.

I believe it's important that the vocabulary understood by the game is sufficiently extensive so that the stumbling block is purely what to do, not which verb to use. I very much enjoy carrying forward themes from one adventure to another and running jokes can also introduce a feeling of familiarity to the adventurer and make for a sense of continuity.

I ensure that none of my adventures recognises any bad language. While it may be humorous to receive a rebuke from the micro if some rude words are entered, I feel that it could encourage some younger people to experiment in order to discover just which ones are recognised. To me that would be to promote a negative aspect.

One thing which has surprised me, however, is that the vast majority of adventurers are not youngsters. And a great many of them also enjoy doing crosswords. It is almost certainly true to say that adventurers are thinkers.

While talking with Rob and Mike O'Leary of Robico I was struck by the fact that they agreed with me that the adventurer should not have to think: "What is the solution to this puzzle?" Instead, it is preferable for the adventurer to feel that he or she is part of the story and wonder, for example: "How can I distract that dog?"

Merely considering an adventure to be a puzzle detracts from the feel of the game. With the sense of familiarity, depth of background and a strong plot line, the adventurer can really be there.

> *It is almost certainly true to say that adventurers are also thinkers*

B B+

Now Suds hit New York

Into the world of fantasy with the Mad Hatter

IN the March column I mentioned a pre-production cassette of the sequel to Riverdale's Suds called, appropriately enough, American Suds. Flushed with success after your triumphs in Suds, you find yourself at an airport. Now you must find your way to New York, and then survive in the environs of something horrendously reminiscent of Dallas.

The first three problems you meet involve boarding the plane, surviving and leaving it safely as it circles New York. Given the humour, you won't be surprised that airport security no longer requires the presence of metal detectors. On the other hand, customer security most certainly requires an understanding of effective defenestration techniques.

I don't want to give too much away, but once again this quilled adventure offers good value for money. If you enjoyed Suds, you'll find the sequel provides similar entertainment. American Suds is available on cassette from Riverdale Software, 95 Printon Avenue, Manchester M9 3JW for the modest sum of £4.

Final thoughts on **Elite**. Having mixed my playing sessions between a borrowed Master and my BBC B with 6502 second processor combination, I have achieved Elite status – 24 *Right on Commanders* in all – without doing the second mission. Mind you, if you need my help in the second mission, you don't deserve to be Elite anyway.

New from Topologika

I mentioned last month that the new software house Topologika had re-issued some Acornsoft classics and you may have seen my review of one of them, **Kingdom of Hamil**, in that issue. I now have further information that will whet the appetite of anyone contemplating multiple purchases of **Philosopher's Quest, Countdown to Doom, Kingdom of Hamil** and **Acheton**.

The discs cost £9.95 individually, £15 for two, £20 for three, and if you order all four the cost is £22 – quite a saving. Available from Topologika, P.O. Box 39, Stilton, Peterborough, PE7 3RL. All will run on BBC B, B+ and Master. Topoligika is preparing Compact versions, too.

I found it supremely ironic that, having regaled readers with a fairly detailed solution to Philosophers Quest in recent columns, it should once again be readily available. However, the new version is half as large again and, says Peter Killworth, "is almost exactly the version of the Cambridge IBM 3084, which I cut down to fit the BBC Micro".

Philosopher's Quest revisited

Old hands will recognise right from the start that there have been changes. Admittedly you begin in the shop, and the familiar keys and aqualung are there – but that's all.

You are given the added information that the aqualung works automatically on contact with water. You are also faced with a teabag, a piece of curled up sausage and a nice soft cushion. The rod has gone, and the puzzle it used to solve in the corridor has likewise vanished.

I don't want to spoil things, but I think a brief account of what I found on a preliminary reconnoitre will not go amiss.

I decided first to see how the poor old lady, drink problem and all, was getting on. The puzzle chain is slightly extended and it is now a little

Assumptions can slay you

They say that in spring a young man's fancy turns to thoughts of love. What happens to middle-aged crackpots is more like a dose of nostalgia. To date, the fewest queries I have had on a Level 9 adventure undoubtedly concern **Adventure Quest***. I suspect that many gave up on it too early. Even I failed to get maximum points – 5375 out of a possible 6000 – and awarded myself a* must do better *comment as well.*

I liked the scenario of the game very much. It involved finding a Talisman and then taking it twice through the four natural elements of earth, air, fire and water before defeating the evil entity Agaliarept.

I enjoyed playing it tremendously, even though I had difficulties at times. Because it was a sequel to Colossal Adventure, the starting locations were the same but the scene was set many centuries later, with all the changes you might expect.

The biggest problems for me came early on in the adventure – in the desert of all places: I made too many assumptions. This is something that often troubles adventurers when we add two and two together and sometimes expect the answer to be ten. I'll illustrate this very simply: In the desert I came across a giant Sandworm that killed me. Since I have read all Frank Herbert's Dune novels I thought I knew how to deal with Sandworms.

I assumed that they were a means of travelling and spent some time looking for the hooks that worm riders use and, failing in that quest, I spent ages entering permutations of RIDE WORM and similar instructions.

What Pete Austin actually wanted me to do instead was to adopt the broken rhythm walk of Herbert's desert Fremen and lead the worm to an object that had to be destroyed. This is a perfect lesson in how to avoid too many assumptions when adventuring.

ADVENTURE QUEST LOGICAL MAP

Room	Description	Move	Result
22	Edge of fertile land: Desert N, Mt. just visible N,N,N,W,N,LOOK,E,E,E to 31	S N	21 23
23	Southern edge of Desert	S N	22 24
24	Trackless Desert	S 2 x E W N	23 25 Repeats 26
25	Trackless Desert beside Black Pillar WHITE DOT	2 x W + 2 x S	23
26	Trackless Desert	S W	24 27
27	Trackless Desert	N	28
28	Trackless Desert above deep Canyon Oasis at foot of Southern cliffs	E	29
29	Trackless Desert S of Canyon	E	30
30	Trackless Desert S of Canyon: outcrop E Flat topped Pyramid: SPHINX Moves noted at 22 make WORM devour Sphinx	E U	33 31
31	Top of Pyramid: SNAKES and Temple (Play PIPES)	D IN	30 32
32	Inside roofless Temple: Priestess requests SUN-DIAL Getting S-D here brings RUBY in return	OUT	31
33	Rocky outcrop overlooking pyramid Path N and D into chasm	N	34

more powerful. On the other hand, the beach area is much more fascinating than before and a nicely balanced puzzle awaits the unwary. It caused me to kick the bucket a couple of times before I finally weighed it up.

The acid test where any re-issued adventure is concerned is: Can I still recommend it to newcomers? The answer here is a decided yes. But there is more, too. If you have the old version of **Philosopher's Quest**, this enhanced one is different enough to make it a new game.

Recent advice given in this column will help you, but not spoil the game for those who have read it. Also the disc provides online help so, if you get stuck, the answer is available.

Next month, I hope to take a closer look at the re-issued **Countdown to Doom**, again by Peter Killworth. Until then, happy adventuring.

PROBLEM CORNER

How can Nick Richardson stop the cranes squashing him in the Missile Factory Sector 1 of *Codename: Droid*?

Hatter's Helpline

Some good news for Master owners who have laid aside their versions of **Acheton**: Two readers have sent advice, and here is a summary of what Messrs Hickman and Smith wrote:

Chain the Convert program from the Welcome disc, pressing Control+Break when instructed. Put the Acheton program disc in drive 0 and press Shift+Z+Break, holding the Shift and Z keys down until the title page loads.

The game can now be played as normal except that you can no longer save your position on drive 0 – it is now classified as read-only.

Robin Smith adds the following tip: Copy all existing saved positions to drive 2, but in 80-track mode, give a filename of four or less letters then, when prompted for a filename, include the drive specified. So 2Ach1 would indicate the first position saved on drive 2.

Oh dear, a lot of you are still having **Hobbit** problems. In the Elven King's Halls do not abandon Thorin however irritating he is. Make him get into a barrel and once the butler has thrown it through the trapdoor, jump down yourself while wearing the ring. You need his grandad's key, and Thorin won't give it up.

Tony Marter has the solution to R. Chapman's **Castle Dracula** problem: LIGHT MATCH is the correct input. Why can't we have a universally agreed way of creating light. FIAT LUX maybe?

A broke – and boozed-up – Hermes staggered in from Berlin recently with a list of games that run on the Master 512. Infocom: **Zork I, II,** and **III**, **Leather Goddesses of Phobos**, **Ballyhoo** and **Suspended** – this last one runs on MSdos 2.1 only.

Other adventures for the Master 512 are: Simon and Schuster – **Star Trek: The Promethian Prophecy** and Broderbund – **Where in the World is Carmen Sandiego** and **Where in the USA is Carmen Sandiego**. Hermes wonders if anyone else has the Star Trek game: He's stuck, and there's no published clue sheet.

By the way, it is rumoured – with some authority

Turn to Page 44 ▶

HALL OF FAME

William Hadden of Co.Down has sent me a meticulous solution to *Thunderstruck*, and Ian Weston one for *Sorcerer of Claymorgue Castle*. So that's two more adventures that I can help you with.

◀ From Page 43

– that many PC-compatible games run perfectly on the Archimedes with PC Emulator. It looks as though we're in for a big expansion of the adventure market.

Barbara Gibb is back with yet more help. In **Rebel Planet**, to enter the university you need the tuning fork from the hotel basement and the crystal from the museum basement. Tap one with the other for a grand entrance. The guard needs the brew from the hotel basement.

In **Masters of the Universe** it appears you don't need to pass Evil Lynn, although JUMP will do the trick while SWIM gets you to the drawbridge. Barbara's comment on the game: Full of loose ends.

Gavin Shek offers help in three first-rate Robico adventures.

Rick Hanson: To stop the tape killing you think of it as a grenade. To lose the guy in the shades and coat, jump off the bridge and on to the train. Use the spanner on the guard, and think of the one-armed bandit as a source of cash. Finally, to crack the codes, ponder your room number, the alphabet backwards and the twelve Apostles.

Project Thesius: First get some clothes and then try drying the towel rather than yourself. Also, dig where you might find a treasure chest and then do a spot of examining.

Myorem: To reach the creeper, empty the drum and then stand on it. Use the twig to take the can, and once you have cut the creeper think what Tarzan would do. The drum can be made to float, of course.

In **Codename: Droid** this is what S.Bains has to say to J. Morrison: Go to the Herbert droid and touch it – you will hear a ringing sound. Go back to where you entered the screen, then down to the tables and chairs. Get the remote activator and return to the droid. The ventilation pipe is now repaired and you can get to the mystery crate which contains passwords and energy cells.

Richard Entwistle offers a memory prod for Gavin Reid in **Gisbourne's Castle**: Collect the lamp, rope and wooden key and take them to either trapdoor. Use the rope and the key – simple.

Richard also offers a suggestion for Andrew McLernan's **Lord of the Rings** load/save trouble: When you have successfully completed a section you are congratulated and prompted for a filename. SAVE here as ENDPOS1 – for part 1a – and when you have loaded part 1b you will be asked if you want to load an ending from section 1a. Answer Y, and now load ENDPOS1 and then continue to choose hobbits. If that doesn't work, try checking the tape recorder.

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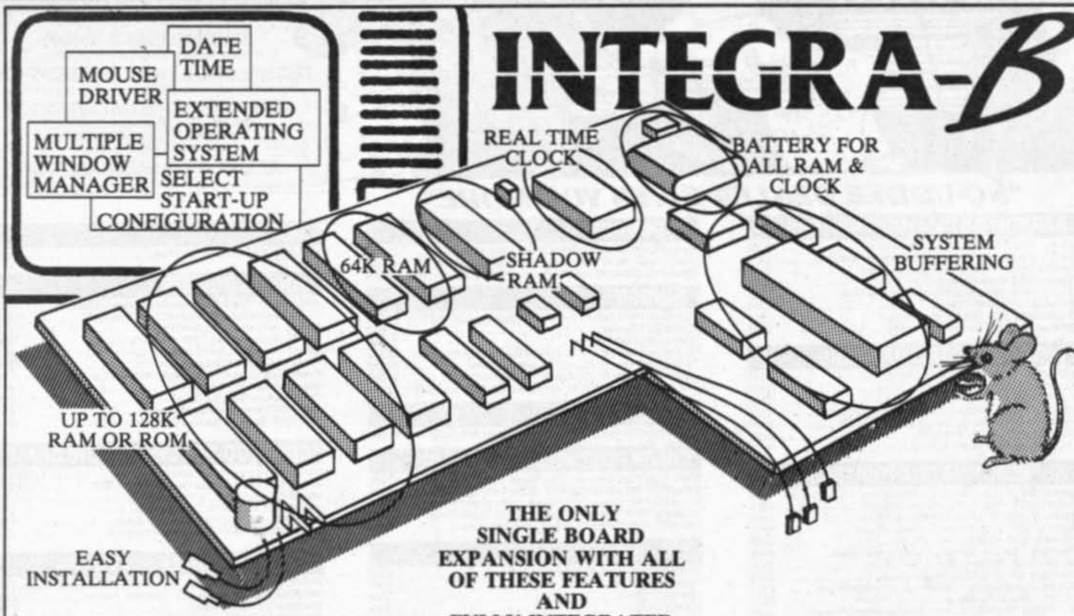

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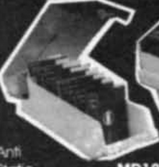

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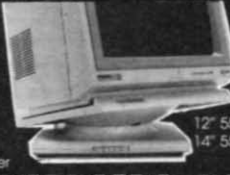

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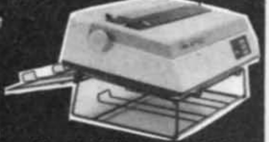

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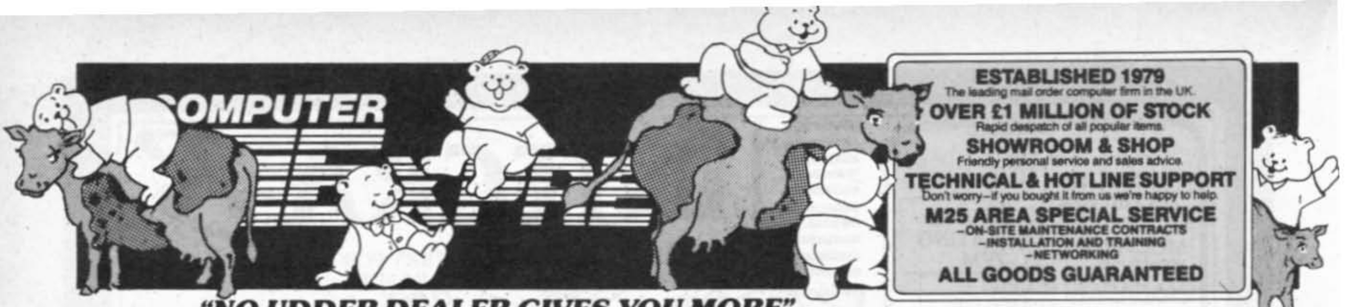

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

On the agenda...

- *Converting a trackball*
- *Interfacing to a transmitter*
- *Connecting an alien drive*
- *Disc corruption problem*
- *Cure for pink displays*
- *Discs and magnetic fields*

Having a ball

COULD you please tell me how to convert the two signals produced by my Marconi trackball into left, right, up and down? I do have the Control rom, but would like to create software of my own. – **Mark Taarkard, Shipley, Bradford.**

● *There are many ways to do this, and most have been covered in past Body Building articles. The January 1985 issue of* The Micro User *showed how to convert the signals into an analogue signal suitable for putting into the joystick port, and that year's February magazine showed how to connect it to the user port and do the conversion in software.*

The July 1986 issue showed how to make the trackball signals compatible with the AMX mouse, so you could use either software.

BBC Micro radio

I WOULD like to interface my BBC Micro to a dual channel radio control transmitter. My idea is to send analogue signals into it in place of the two existing joysticks.

Have you have published any suitable D to A circuits as part of your Body Building course? If so can you tell me which issue it was in and whether one can still buy a kit of parts? – **Chris Houston, Frensham, Farnham, Surrey.**

● *The October 1984 Body Building contained an 8 bit digital analogue converter that plugged into the user port. The kits are still available from Musbury Consultants at £20.60 for the kit or £26.85 assembled plus £9.99 if you want the connecting cable.*

However, these produce an output between 0 and 5 volts and it is unlikely that this would be suitable for direct connection to your radio control system, as the pots in it may be acting as a pulse divider.

What you have to do is to investigate, with an oscilloscope, the signals and DC voltages around the pot. Then try to replace this with a simple operational amplifier and control voltage, as you'll need this to convert the 5 volt signal to the correct level.

Also make sure that the earths of the system are at the same potential. Japanese electronic circuit designers are well known for unconventional approaches that save money but make any change very difficult.

Old drives with new

I HAVE recently acquired an old Tandy TRS-80 disc drive and was wondering if it would be possible to interface it to a BBC B and a Mitsubishi disc drive in order to get a double 40/80 disc drive. I have no knowledge of electronics at all and any help would be much obliged. – **Damian Zarattini, Horsham, West Sussex.**

● *The drives used with the old TRS-80 computers were normally 35 track units. Some would extend up to 40 tracks but others would not. If they will not then you might have to write a special 35 track format program or modify an existing one. It is very unlikely that they are 40/80 switchable drives.*

It is quite simple to fit one of these to your existing system. First of all get a cable with two drive connectors and replace your original cable. Look on the electronics board of the new drive for a set of links. One will be set to make the drive look like drive 0 – change the links to the drive 1 position.

Also you will see a flat pack of terminating resistors close to the edge connector: These must be removed from one drive if you have two. If you can't cope with all that, you could ask a local dealer to do it for you.

Impossible corruption

I HAVE recently been inspecting my issue 7 BBC B's circuit board and have found a set of 10 pins labelled PL14 in the bottom left hand corner. Could you please tell me what they are for? Also there are two rows of empty holes at the right of the keyboard. Are these any use?

The reason I have been looking is that the "impossible" happened: The micro corrupted a write-protected disc. After putting the disc in the

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◀ *From Page 47*

drive, I tried to boot it up. There was a long pause while the drive motor went round, and then the message *Drive fault at 00/00* appeared.

After checking connections I tried to catalogue the disc. All then appeared well until I found that the disc was corrupted. Then next time exactly the same thing happened except that I could not get the drive to catalogue at all.

By chance I have discovered that pushing the left hand corner of the motherboard – by the disc drive port – up, the fault appears to be cured. At present the board is held up by a rubber band.

Naturally I thought it must be a loose connection on the motherboard, but I can't understand why the disc was corrupted. – **K.West, Bradford, West Yorks.**

● *Acorn's original intention was to have a cartridge socket on the left hand side of the keyboard: PL14 is where the upgrade kit would plug into the main board.*

The holes on the bottom of the keyboard allow you to insert links to set up different delay times for slightly faster disc drives. The increase in speed however is not very great and in my opinion can cause more trouble than it is worth.

However, some of these pins allow you to change the screen mode at switch on as well as making a Shift+Break action occur with just a Break. This is useful to get a program to boot up automatically on power on. See the Advanced User Guide for more details.

It is not possible for the disc controller to write to a protected disc. The write protection system is in the controller and not the drive – but that does not mean that it cannot get damaged. Turning the power off with the disc still in the drive can damage the disc: As the power is removed the collapsing field in the disc's read/write head can cause a magnetic blip on the disc.

This can also happen when you have intermittent connections to the drive, especially to the write data line. In effect the intermittent signal is just like a real data signal.

> *Turning the power off with the disc drive can damage the disc*

Replay problem

AS I was trying to fit my new Replay under my ATPL rom board I had a few problems – mostly with legs dropping off. I managed to solder them back, only to find a connection has decided to remove itself from a certain little bit of plastic.

I will send that back, but my problem now is that my display has gone bright pink. What have I done? It still works.

The other strange thing is that just before it went pink it kept pressing the Break key all by itself. Please tell me what I have done and is it fixable? This pink is making me feel sick. – **Paul Bailey, London.**

● *Pink is a very strange colour to get on a moni*

TAXAN 625
TAXAN HAVE MADE THE BBC A PLEASURE TO WATCH.

tor, are you sure that it is not magenta? You do not say if the whole screen or just what is supposed to be white is affected by this malady. If it is just the white then I am sure that you are missing the green signal to your monitor. The most likely cause of this is a loose socket on the RGB output of your micro.

It is very unusual for a micro to press Break by itself. I can only think that when you replaced the cover you trapped the Break key and any pressing on the lid could cause the reset.

Taping the Compact

I HAVE a Compact and recently the Welcome software supplied with it began to play up. Soon after we got it I made a backup copy of the disc as advised in the manual. Then the original developed a fault, refusing to load properly. At the same time some of my own discs were mysteriously wiped clean.

I suspected dirt or mains hum as the culprit and have since kept all my discs in a dustproof metal box well away from the micro. I made another copy of the disc from the backup and all was well for a couple of weeks. Then recently both the copied disc and the original broke down at once. All my other discs are ok but this one seems to be losing data in little bits. Only the main directory can be catalogued now, the rest of the disc being full of errors.

Can you suggest what my problem might be? As the micro is still under guarantee will I be able to get a replacement free of charge from the dealer?

Also as the Compact has no special tape port, can I connect a tape recorder via the RS232 port? Would I need an interface? How would I load and save programs in this way? – **Rhydian Blackmore, Llanwrda, Dyfed.**

● *I strongly suspect that your problem is with magnetic fields. These can damage discs and cause the faults you describe. This could be because the read/write head has become magnetised and your dealer should be able to degauss it for your and may also be able to offer you another copy of the disc.*

However, it is more likely that the problem is with your storage. Remember that magnetic fields are produced by things like loudspeakers, electric motors and small permanent magnets. The type used as memo holders are a particular menace.

It is also possible that your metal box is magnetised. Remember that steel does not protect against magnetic fields – it makes them worse.

The Compact can't be used with a tape recorder as there is no provision in the operating system software. It is the sort of interface that could be made but no one has yet done so. I suspect that this is because it would be of limited use as many tape games use programming techniques that would not work with the Compact.

Have you any hardware problems with your BBC Micro? If so, write to Mike Cook, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP, giving full details of your system and the problem.

Unfortunately, Mike cannot send you personal replies, but as many questions as possible will be answered on the pages of The Micro User.

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Archimedes SOFTWARE

Cut price colours

Craig Wareham slaps on the paint with élan as he tries out a new art package

Product: Arctist
Price: £19.95
Supplier: Fairhurst Instruments, Dean Court, Woodford Road, Wilmslow, Cheshire SK9 2LT.
Tel: 0625 525694

The pictures on the opposite page were produced by Craig Wareham and David Lear – both top-rank micro artists – using Arctist.

ARCTIST is the third painting package to be released for the Archimedes – ArcPaint being the first on the Welcome disc followed by Artisan from Clares, which was reviewed in the January issue of *The Micro User*. The main advantage of this new product from Fairhurst Instruments over the others is that artwork can make use of the 256 colours available in Mode 15.

The package is supplied on disc with a manual and function key strip. In addition to the painting software, the disc contains a program enabling you to use any drawing/sprite as a scrolling background in your own programs.

Before booting up it is necessary to ensure the machine configurations are suitable, and any changes must be made manually – this is in accordance with Acorn's policy, but doesn't conform with normal practice. The required alterations are simple but are hidden away on the third page and, if you haven't read the manual, it is easy to panic when the software won't run.

When these configurations are set and the program booted up the title screen appears showing the range of colours available and pressing a key takes you into the main program. You are presented with a clear screen with a pointer and menu bar – containing icons for most of the facilities available – is located at the top. A summary of less-used facilities available from function keys provided are shown in the panel. The menu bar can be removed and recalled using the middle – menu – button on the mouse. The left hand button is used to select and the right hand one is for cancel.

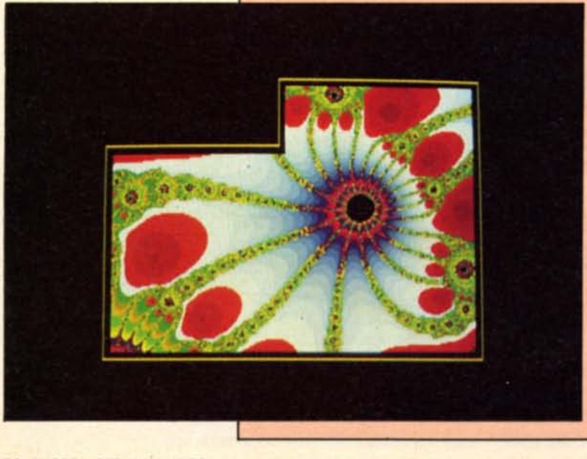
On the left of the menu bar is the palette icon, which, when clicked, presents the four hues of each of the 64 colours. Careful selection of shade can introduce mood and feeling into your work. By pressing the menu button while on the palette you move into freehand mode: Pressing cancel takes you back to the main menu.

The dripping tap icon represents the flood-fill operation but unfortunately there are no pattern fills and you can't fill one shade of colour on to another shade of the same colour.

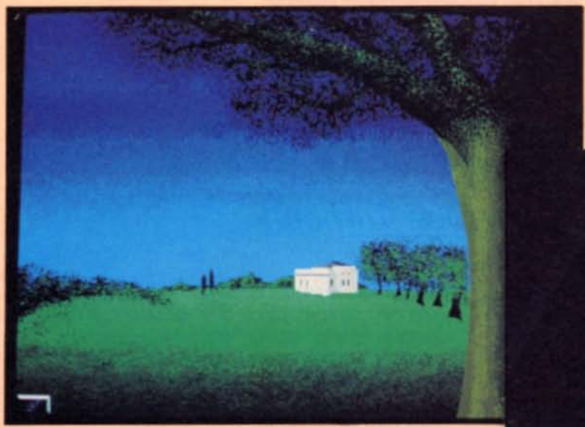
There are three rubber band shapes – rectangle, ellipse and triangle – and each can be drawn outline or filled – toggled by the fill-on icon.

This is a very narrow set of options considering what the operating system can easily support: Arcs, segments and chords do not appear at all, while circles are relegated to a subset of ellipse

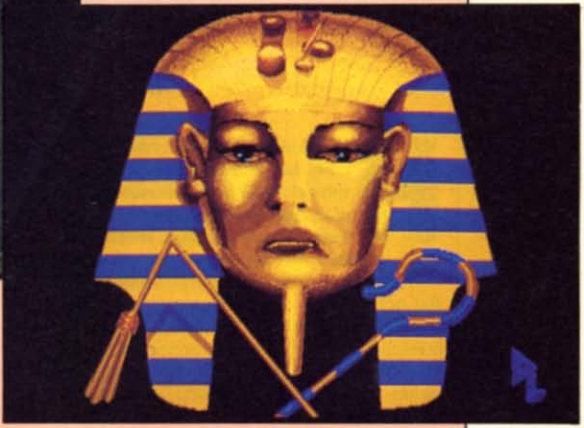
Key	Function
Shift+f1	Display disc directory
Shift+f2	Format disc
Shift+f3	Save screen to memory
Shift+f4	Recover screen from memory
Shift+f5	Perform grey-scale screen dump
Shift+f6	Perform faded grey-scale screen dump
Shift+f7	Perform blocked grey-scale screen dump
Shift+f8	Perform black and white screen dump
Shift+f9	Toggle grid on/off
Shift+f10	Darken screen area
Shift+f12	Lighten screen area



Arctist demo picture supplied with the package



A landscape demonstrating the Arctist spray can



Tutenkhamen

which makes them very difficult to draw accurately.

There are two independent flip options – up-down and left-right – neither of which can be used in conjunction with a block move or copy. There is also a colour invert operation on a rectangular area.

The continuous line function is the most used in any art package, but unfortunately it is poorly implemented in Arctist. It doesn't allow you to stop the line drawing, move the pointer and restart, so instead you have to cancel the operation, reselect the icon and restart at the new position. There is a ray drawing option, but this has limited use.

Selecting the spray icon displays a menu giving a choice of 10 spray densities from a very light to very heavy coating. This random spray can effect works really well, and is one of the highlights of the package.

The final three icons are rubout for clearing rectangular areas, block copy and disc access. The last is a little tatty, as the load and save options are a little close together and it is easy to choose the wrong one. Not only that, there is no warning if you are about to overwrite an existing file.

It is possible to get text on to the screen but only in the standard font, and you can't cancel what you've written if it doesn't fit properly – you can only paint over it.

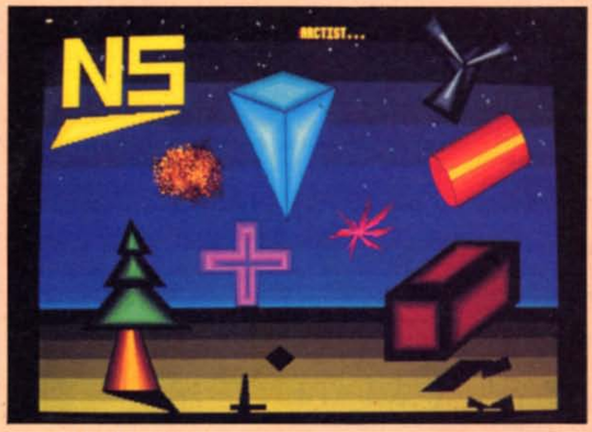
Each screen is saved in the standard format so it can be included in your own programs, and in addition there is a sprite option to load or save individual portions of the screen. With this you can create your own library of common drawing components.

The pixel editor works fine except that you cannot edit the top right fifth of the screen where the display is sited. You can scroll your picture across the screen until the section you want to edit appears, but although it works this procedure is awkward and slow.

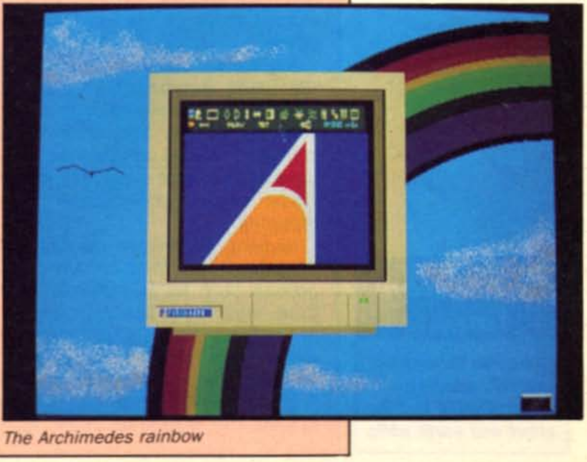
Arctist contains some excellently implemented options, such as the spray, but others, such as the text and shapes, really let it down. This package is not as easy to use as Artisan and lacks many of its useful features. But bearing in mind its 16 times the number of colours and at half the price, Arctist is well worth buying.

The bottom line...

Worth the price and has an excellent spray feature. But lacks the ease of use and features of more expensive packages.



Abstract in 256 colours



The Archimedes rainbow

Archimedes SOFTWARE

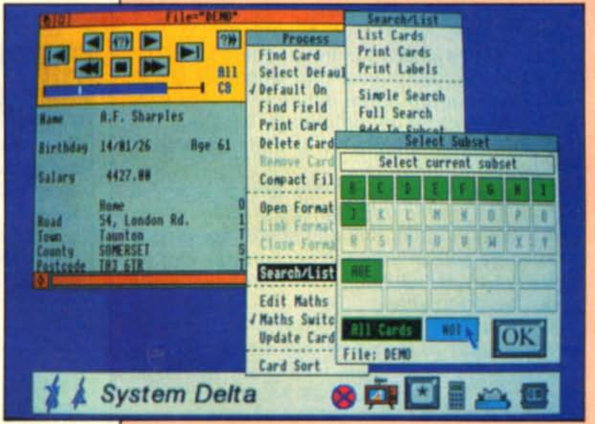
Data power

Sampled by Don Turnbull

HAVING used database systems a little in the past, for address applications mainly and without finding any pleasure in the experience, I approached Minerva's System DeltaPlus with some built-in reservations and at first I was sure that my fears were well-founded.

The early pages of the accompanying manual did not seem to offer the simple straightforward approach to which, in my opinion, any buyer of a complex piece of software or hardware is entitled. The first few chapters, a simple grounding in using the Archimedes Wimp, obscure what you really need to know.

However, perseverance pays off. Once past the opening pages and into the demonstration section, learning about the system becomes enjoyable and relatively easy. The experimentation section takes the beginner through the Card Index functions step by step, building up a wider and wider picture of file construction and manipulation.



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A system of very clear Wimp menus

A system of very clear Wimp menus control all the usual database functions and, helpfully, clicking the mouse anywhere on the empty screen calls up a menu from which a new file can be created or an old one opened. In addition a fixed pane at the top of every record screened contains video control-style icons for fast or slow browsing.

Clicking the mouse on this pane produces a Process menu that controls record handling actions such as Search/List, Find Card, Delete Card, Print Card, Card Sort and so on. There are 16 options in all, plus three sub-menus. This menu also enables the execution of mathematical and statistical operations on data.

Icons, available at the foot of all screens, provide the regulation clock, calculator, printer controller, monitor adjuster – a useful feature – and two special icons that enable you to call up system commands or halt an operation.

Multi-tasking is easy since up to eight files can be open at any one time and it is quite feasible to, say, print from one file while browsing a second and searching a third. It is also remarkably easy to divide any file into sub-sets – as many as 32 – which can be manipulated independently of each other and of the file from which they are drawn.

Vital to those of us with accumulated data on earlier BBC Micros is the Import facility which will handle data from Mini Office II, Viewstore, dBase, Beta-Base, InterBase, pure Ascii, Lotus and Data-Gem. Minerva will also advise on the transfer of data from other systems not covered in its manual.

System DeltaPlus is quoted as being able to handle 2.14 billion records – for a world census perhaps? The statement puts the scope of the system in perspective.

While DeltaPlus holds out all sorts of enticements to programmers and specialists in database management, the majority of those who buy it will do so for the Wimp Card Index System which, once mastered, is certainly a pleasure to use.

Sensibly Minerva has taken every possible advantage of the Archimedes Wimp environment and added a few twists of its own. Written as an extension for the resident language, System DeltaPlus makes full use of all the power and speed that the machine offers. In practice this means that the non-technically minded have a very user-friendly system, while serious programmers can produce simple utilities or complex relational applications in whatever language they prefer.

The impressive speed of DeltaPlus derives from the basic routines written in ARM machine code. The use of Basic at operator level gives remarkable ease of use – compiling and manipulating data has never been so enjoyable.

Perhaps the manual is not quite all it could be, but once you are into the system – and for the novice this means only an hour or two of work – it becomes a useful guide to further enlightenment. There is, or will be shortly, an Advanced Programmer's Manual for those who wish to construct their own personalised systems. Good luck to them.

As it stands System DeltaPlus is just what the other 99 per cent of us need and want right now.

Product: System DeltaPlus
Price: £69.95
Supplier: Minerva Systems, 69 Sidewell Street, Exeter EX4 6PH.
Tel: 0392 37756

The bottom line...

Beaver on through the manual's opening pages – you'll find the effort well worth while.

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MUG THE INDEPENDENT MicroLink User Group NEWSLETTER

Bulletin Board update

The MicroLink Bulletin Board has just had a spring clean, and a backlog of 9,000 old messages removed. But at the rate at which it's being used, it won't take more than a couple of months to replace them.

The Bulletin Board is an area where anyone can leave a public message, start or join in a discussion on any topic or just ask for help.

The range of subjects covered is huge and always changing; cars are bought and sold, philosophy, pop music and poaching argued about and the reasons why somebody's software doesn't seem to work are revealed.

There are even the occasional trivia quizzes (well, do YOU know how many electric tramways are still running in the UK?).

There's nothing quite like it outside the world of computers, but be warned. It can be very addictive.

Preparing for Prime time

EVERYONE upgrades their hardware occasionally, and MicroLink is no exception. But it's not an Amstrad PC1640 they're getting.

For some time now, the rate at which people are joining has put a bit of a strain on the old Prime 850 computer, and many users would agree that sluggish is perhaps a mild way to describe MicroLink at peak times.

Now work is underway to install a Prime 9955 – not only has it got a longer name but it's faster and better able to cope with the increased demand.

There's a lot of things to be done before the switchover can happen, software has to be changed and the digital detritus collected on the old computer in its years of dealing with us humans has to be cleared up.

Exactly how much better the new service will be isn't clear, although technical people tend to use words like "massively" and get quite excited.

We're all eager to find out . . .

The MicroLink User's Manual

ONE of the projects that MUG is coordinating is the production of the MicroLink User's Manual. Designed to complement the information given to every MicroLink subscriber on old fashioned paper, the manual sets out to be an online way of describing the many facilities available on MicroLink from the point of view of the people who use them.

At first, MicroLink can appear to offer a bewildering selection of things to try, and even for experienced users the different options can be confusing. And there's always a way to do things faster, or at less cost.

Of course, the information to help people do this has always existed. But it's been hard to find, and until now there hasn't really been any way for users to share their discoveries in such a way that others will be able to make use of them. The MicroLink User's Manual sets out to remedy this problem.

At the moment MUG is collating the information. Sometimes the amount of data collected by users can be staggering – one subscriber mailed in over 200k of hints and tips saved up over years. Of course, we're just as happy to hear from anyone with one good idea.

All the data will be indexed and made available; the exact design is still being discussed, but like anything else MUG does, it will be free to use.

User groups are good news

THE MicroLink Users' Group came about as a result of various subscribers asking whether there was any organisation run to help users.

User groups in any area are usually good news; they form a focus for ideas, opinion and self-help and give the users a collective voice.

The flexibility provided by MicroLink and Telecom Gold make MUG particularly useful. There are no printing costs for newsletters and there's almost instant access to everyone in the group through the mail system.

MUGs been going for about a month now, and we've already formed a team of people who have volunteered to answer queries and help anyone with MicroLink-related problems.

It's a small world . . .

. . . but full of Telecom Gold computers, it seems. The UK Telecom Gold system, of which MicroLink is the most active part, is just one sector of a global network called Dialcom.

While MicroLink is System 72, and other UK computers are in the range 70 to 90, there are Dialcom computers almost everwhere. And like international telephone exchanges, they've all got their own numbers.

MUGger Adrian Mars is trying to find out just which computers are where. This might seem an eccentric, if harmless, hobby, but such information as is available on MicroLink is difficult to find and (apparently) out of date.

And it could be the first step to organising an international group of Dialcom users, which really would be a first and another step towards the electronic community of tomorrow.

If you know anything about the Dialcom network numbering scheme, then Adrian (MARS.ADRIAN on the mail system) and MUG would be glad to hear from you . . .

Odd offers

THE prize for the most unusual use of MicroLink goes to . . . well, nobody knows. But the last month has seen some odd goings-on.

There have been people advertising for goose shooting, others looking for burned out buildings and the usual range of online floral orderings to persuade mothers and lovers that computers aren't so bad after all.

But you have to take your hat off, if nothing else, to Keith Channing. He helps run CORAL, Clothes Optional Recreation and Leisure, a naturlist organisation dedicated to promoting the various activities enjoyed by those who feel happier without their clothes on. And with a bit of advertising on the Bulletin Board and a touch of help from MicroLink themselves he's gathering together all those on the system who are similarly inclined.

Now that has to be the most original use for MicroLink.

Unless (of course) you know better...

Suggestions of material for inclusion in the MUG Newsletter should be sent to Rupert Goodwins on MAG95816

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Back up your DFS discs to ADFS

Rob Anderson's utility does just that

HERE is a utility that enables the programs on a DFS disc to be copied to an ADFS disc with as little fuss as possible. It works by creating a directory under which all the files on the DFS disc are to be placed and automatically creates any further single-letter subdirectories so that an exact replica of the original disc can be made on the ADFS one.

The program is 6502 second processor compatible and a dual drive is required. It differs from the ADFS utility COPYFILES in that you don't have to change the single letter directory of each source program to enable it to be placed on the ADFS disc and you don't have to mess about creating single letter directories.

So your DFS disc may now be upgraded to ADFS without the need to alter the programs which may expect to find certain files in various directories. It is simply a matter of entering this new directory, after which the disc will appear to be a normal DFS one except in one or two cases described later.

Option	Action	Description
1 or *	OS command	A prompt asks for the string to be passed to the operating system. For example, using this option you could catalogue the ADFS disc by typing: `*-ADFS-.` Don't use commands that could interfere with the program like *COMPACT, which requires user ram.
2	Change DFS disc	Enables a different side of the DFS disc to become the source drive and gives you the opportunity to change the DFS disc.
3	Change ADFS directory	A new ADFS directory may be specified. This name represents the new directory which is to be created by the program, under which all specified entries on the DFS disc will be stored. The default is $, but it is better to store every DFS disc that is copied under a unique subdirectory name that reflects the DFS disc the files came from. This helps keep the DFS files stored on the ADFS disc separate. Note that the name entered here is assumed to be with reference to the root directory.
4	Begin copying	Starts transferring selected files from the DFS disc to the ADFS one, under the directory specified using 3 – $ by default.
	Exit	Returns to Basic.

Table I: The available options

Using the utility

When you chain the program you are prompted for the DFS source drive – 1 or 3 – and the utility assumes the ADFS destination disc is in drive 0. The front panel of the program is entered and you'll see a catalogue of the DFS disc previously selected plus the list of available options, see the panel alongside..

The arrow keys may be used to move the cursor which initially points at the first catalogue entry. Pressing Delete makes the current one vanish, indicating that this file is not to be copied across when the backup takes place – using option 4. Pressing Copy re-displays the entry, so that the file is copied. Either key can be held down while moving the cursor enabling a number of catalogue entries to be quickly selected or deselected.

How it works

The DFS catalogue is loaded using the osword &7F call which reads in the first two sectors of the disc – where the catalogue information is kept. The data table is stored in zero page and the result buffer is held at &3000 onwards which, once it's stored in the array *name$* and *X%*, can be overwritten during the copying process. This uses a memory buffer from TOP+2000 to &7C00.

The files are transferred using *LOAD and *SAVE, unless the file is bigger than the memory buffer – whose size is held in *buffer%* – in which case the much slower, but more versatile, *MOVE is used. The length, load, and execution addresses of the files could have been obtained from the first two sectors of the disc which were read using osword &7F, but osfile 5 is used as it is more convenient.

Backup in action

Suppose a DFS games disc – in drive 1 – holds the programs:

```
INVADER
D.INVADER2
D.INVADER3.
```

Firstly, the DFS side number must be entered – 1 in this case. Next, the ADFS destination directory could be specified by using option 3 to enter the name GAMES1. Then, by pressing 4, all the files on drive 1 will be transferred, creating the ADFS structure shown in Figure I.

By using this method INVADER can still chain the other files – INVADER2 and INVADER3 – because they are still in directory D.

However problems can occur if a file in one sub-directory makes access to a file in another. For example, consider the following programs held on a DFS disc:

Filename	Program
$.PART1	10 *DIR A 20 CHAIN "PART2"
A.PART2	10 CHAIN "B.PART3"
B.PART3	10 PRINT "HELLO"

This works all right on a DFS, but once it is copied across to the ADFS disc, access to the B directory could not be made from the A directory which had already been entered in the first program – PART1.

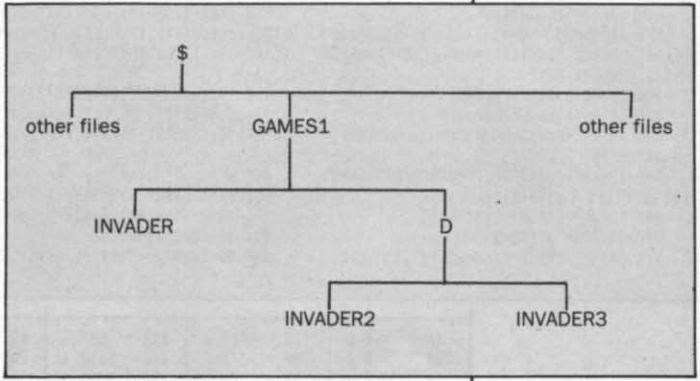

Figure I: The ADFS file structure after backup

This case is rather unusual and the programs could be altered quite easily by specifying any directory references from the root ($) directory which, in our example, would involve changing A.PART2 to read:

```
10 CHAIN "$.B.PART3"
```

```
   10 REM DFS to ADFS backup
   20 REM by Rob Anderson
   30 REM (c) The Micro User
   40 HIMEM=TOP+2000
   50 ON ERROR PROCerror
   60 DIM name$(31),X%(31),info 18,fname
 10
   70 VDU22,7
   80 PROCinitial
   90 PROCfrontpanel
  100 VDU22,7
  110 *FX15
  120 *FX4
  130 END
  140 DEFPROCerror
  150 REPORT:A%=FNanykey:RUN
  160 ENDPROC
  170 DEFPROCinitial
  180 ff%=&FFFFFF:*FX4,1
  190 adfsdir$="$":osword%=&FFF1:table%=
&3000:buffer%=&7C00-HIMEM
  200 osword%=&FFF1:osfile%=&FFDD
  210 table%=&3000
  220 FORA%=1TO31:name$(A%)=STRING$(8,"
"):X%(A%)=TRUE:NEXT
  230 PROCtitle
  240 PRINT''CHR$131"An ADFS disc must b
e placed in drive 0."
  250 dr%=FNgetdfsdrive
  260 PROCgetdfscat:ENDPROC
  270 DEFPROCfrontpanel:PROCtitle
  280 FORA%=1TO5:READA$:PRINTTAB(0,18+A%
)CHR$131;A%;CHR$134A$".":NEXT
  290 PRINTTAB(0,24)CHR$131"Cursor keys,
 Delete & Copy"CHR$134"to select.";
  300 VDU28,0,18,39,3:PROCshowdfscat
  310 REPEAT
  320 IFINKEY-49ORINKEY-73 PROCos
  330 IFINKEY-50 CLS:dr%=FNgetdfsdrive:P
ROCgetdfscat:PROCshowdfscat
  340 IFINKEY-18 PROCdestdir
  350 IFINKEY-19 PROCcopy
  360 IFINKEY-26 IFX%>0X%=X%-13
  370 IFINKEY-122IFX%<26ANDFNemntnos(X%+
13,Y%)<=numfile%X%=X%+13
  380 IFINKEY-58 IFY%>3Y%=Y%-1
  390 IFINKEY-42 IFFNemntnos(X%,Y%+1)<=n
umfile%Y%=Y%+1
  400 IFINKEY-106PRINTTAB(X%+1,Y%)" ";:X
%(FNemntnos(X%,Y%))=FALSE
  410 IFINKEY-90 PRINTTAB(X%+1,Y%)CHR$15
2;:X%(FNemntnos(X%,Y%))=TRUE
  420 IFX%<>OX%OROY%<>Y%PRINTTAB(OX%,OY%
)" "TAB(OX%+12,OY%)" ";TAB(X%,Y%)"]"TAB(
X%+12,Y%)"[";:OX%=X%:OY%=Y%
  430 TIME=0:REPEATUNTILTIME=5
  440 UNTILINKEY-20:ENDPROC
  450 DATA OS command (or *),Change DFS
disc,Change ADFS destination directory,B
egin copying,Exit
  460 DEFFNemntnos(X%,Y%)=X%/13+(Y%-3)*3
+1
  470 DEFPROCos:CLS:*FX15
  480 PRINTCHR$131"Enter operating syste
m command:"
  490 REPEAT INPUT"*"A$:PROCo(A$)
  500 UNTILFNanykey<>42
  510 PROCshowdfscat:ENDPROC
  520 DEFPROCdestdir:CLS:*FX15
  530 PRINTCHR$134"Previous selection:"C
HR$131adfsdir$
  540 PRINT'CHR$131"Input the new ADFS d
estination"CHR$131"directory : (with re
ference to $)"
  550 INPUTadfsdir$:PROCshowdfscat
  560 ENDPROC
  570 DEFPROCcopy:CLS
  580 PRINT''CHR$131"Creating directorie
s;"
  590 PROCo("ADFS"):*DIR $
  600 IFadfsdir$<>"$"PROCo("CDIR "+adfsd
ir$):PRINT'adfsdir$" directory created."
  610 PROCo("DIR "+adfsdir$)
  620 new$="$"
  630 FORA%=1TOnumfile%
  640 IF NOTX%(A%) ndir$=RIGHT$(name$(A%
),1):IFINSTR(new$,ndir$)=FALSE new$=new$
+ndir$:PRINTndir$;:PROCo("CDIR "+ndir$):
PRINT" sub-directory created."
  650 NEXT
  660 PRINT'CHR$131"Copying the files;"
  670 FORB%=1TOnumfile%:IFX%(B%)GOTO750
  680 PROCo("DISC"):PROCo("DR."+STR$dr%)
  690 F$=RIGHT$(name$(B%),1):IFF$="$"F$=
LEFT$(name$(B%),7) ELSE F$=F$+"."+LEFT$(
name$(B%),7)
  700 PRINTF$
  710 A%=5:X%=info MOD256:Y%=info DIV256
:$fname=F$:!info=fname:CALLosfile%
  720 load%=info!2ANDff%:len%=info!10AND
ff%:exc%=info!6ANDff%
  730 IFlen%>buffer%PROCo("*MOVE -DISC-:
"+STR$dr%+"."+F$+" -ADFS-$."+adfsdir$+".
"+F$)
  740 IFlen%<=buffer% PROCo("LOAD "+F$+"
 "+STR$~HIMEM):PROCo("ADFS"):PROCo("SAVE
 "+F$+" "+STR$~HIMEM+"+"+STR$~len%+" "+S
TR$~exc%+" "+STR$~load%)
  750 NEXT:PRINT"  Copy complete."
  760 A%=FNanykey:CLS:PROCshowdfscat
  770 ENDPROC
  780 DEFPROCgetdfscat:*DISC
  790 PROCo("DR."+STR$dr%)
  800 ?&70=dr%:!&71=table%:?&75=3:?&76=&
53:?&77=0:?&78=0:?&79=34
  810 X%=&70:Y%=0:A%=&7F:CALLosword%
  820 numfile%=(table%?&105)/8
```

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```
  830 M%=table%+8
  840 FORA%=1TOnumfile%
  850 IF?M%<>32 name$(A%)="":X%(A%)=FALS
E:FORB%=0TO7:name$(A%)=name$(A%)+CHR$((M
%?B%)AND127):NEXT
  860 M%=M%+8:NEXT:ENDPROC
  870 DEFPROCshowdfscat:CLS
  880 PRINTCHR$134"ADFS directory:"CHR$1
31adfsdir$"
  890 IFnumfile%=0PRINTCHR$7CHR$131CHR$1
36"NO FILES !":A%=FNanykey:RUN
  900 FORA%=1TOnumfile%STEP3
  910 Y%=(A%-1)DIV3+3
  920 PRINT"  "RIGHT$(name$(A%),1)"."LEF
T$(name$(A%),7)CHR$135;:IFX%(A%)PRINTTAB
(1,Y%)CHR$152;
  930 IFA%+1<=numfile%PRINTTAB(15,Y%)RIG
HT$(name$(A%+1),1)"."LEFT$(name$(A%+1),7
)CHR$135;:IFX%(A%+1)PRINTTAB(14,Y%)CHR$1
52;
  940 IFA%+2<=numfile%PRINTTAB(28,Y%)RIG
HT$(name$(A%+2),1)"."LEFT$(name$(A%+2),7
)CHR$135:IFX%(A%+2)PRINTTAB(27,Y%)CHR$15
2
  950 NEXT
  960 PRINTTAB(0,3)"]"TAB(12,3)"[";
  970 X%=0:Y%=3:OX%=0:OY%=3:ENDPROC
  980 DEFPROCtitle:CLS
  990 A$=CHR$141+CHR$132+CHR$157+CHR$131
+"DFS to ADFS Backup. "+CHR$156:PROCcent
re(A$,0):PROCcentre(A$,1)
 1000 ENDPROC
 1010 DEFPROCcentre(A$,y%)
 1020 PRINTTAB(19-(LENA$DIV2),y%)A$
 1030 ENDPROC
 1040 DEFFNgetdfsdrive:REPEAT
 1050 PRINTCHR$131"Input the DFS disc su
rface (1 or 3).":*FX15
 1060 INPUTdr%:UNTILdr%=1ORdr%=3:=dr%
 1070 DEFFNanykey:*FX15
 1080 PRINTTAB(25)CHR$131;CHR$136"Press
any key";:=GET
 1090 DEFPROCo($&700):LOCAL X%,Y%
 1100 Y%=7:CALL&FFF7:ENDPROC
```

Get it right!

```
  10 =    0 0 | 170 = C10F 6 | 330 = 5EFF 5 | 490 =   50 4 | 650 = 2C83 0 | 810 = E469 4 |
  20 =    0 0 | 180 = 9C7A E | 340 = E5D2 A | 500 = 3C63 4 | 660 = 5FF7 F | 820 = 56D3 A |
  30 =    0 0 | 190 = EB66 7 | 350 = B6D1 9 | 510 = 54D5 1 | 670 = 4764 9 | 830 = 294A A |  970 = AED9 B
  40 = 4C8D D | 200 = EC9F B | 360 = 3F8F B | 520 = B08F B | 680 = ADFA 0 | 840 = 8893 F |  980 = 1F63 1
  50 = 9621 4 | 210 = 50D5 9 | 370 = 5463 7 | 530 = F32C 4 | 690 = B803 B | 850 = 9E76 1 |  990 = 2C8A 4
  60 = 8493 4 | 220 = 7519 8 | 380 = 1CB0 C | 540 = 306E 5 | 700 = 17EE 6 | 860 = D0E6 7 | 1000 = ED0F 8
  70 = 318E 5 | 230 = 5255 2 | 390 = F11D 5 | 550 = D739 9 | 710 = 8CBD 2 | 870 = 1455 3 | 1010 = B0C2 2
  80 = 2CA9 B | 240 = B8C7 5 | 400 = EC44 8 | 560 = ED0F C | 720 = 1B12 5 | 880 = 9A0D 4 | 1020 = B2FD 0
  90 = BA35 7 | 250 = 9A20 A | 410 = 468B 5 | 570 = 5683 A | 730 = 70E0 B | 890 = 8497 3 | 1030 = ED0F 5
 100 = 318E F | 260 = 91DD 5 | 420 = 47F4 7 | 580 = 458B C | 740 = 235F 3 | 900 = B5EA 1 | 1040 = 8E6F F
 110 = A022 B | 270 = F0FF F | 430 = 58F1 D | 590 = C9EC F | 750 = DDF2 5 | 910 = E7BC 5 | 1050 = 93C1 4
 120 =  129 C | 280 = 6539 5 | 440 = 83E0 2 | 600 = 6837 E | 760 = E526 8 | 920 = FBBE 8 | 1060 = 30DA 7
 130 = FD2E 4 | 290 = BDB4 A | 450 = 6A1F 0 | 610 = 8C72 3 | 770 = ED0F 3 | 930 = 9235 8 | 1070 = 22AA 9
 140 = D7A7 C | 300 = 1066 6 | 460 = D120 B | 620 = E6B0 1 | 780 =  EC4 B | 940 = 1169 9 | 1080 = 4A39 5
 150 = 4E5C C | 310 = BFBA F | 470 = 8847 C | 630 = 8893 6 | 790 = A4C0 1 | 950 = 2C83 9 | 1090 = 9F42 5
 160 = ED0F 3 | 320 = 9079 4 | 480 = 8AEB 3 | 640 = 67DB E | 800 = 493A 3 | 960 = E904 0 | 1100 = 50E0 5
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Amstrad LQ 5000 (24Pin) £431.25
Citizen 120D (120cps 80col) £178.25
Citizen LSP 100 (150cps 80col) £212.75
Citizen MSP 10E (160cps 80col) £258.75
Citizen MSP 15E (160cps 136col) £281.75
Citizen MSP 40 (240cps 80col) £345.00
Citizen MSP 45 (240cps 136col) £460.00
Citizen MSP 50 (300cps 80col) £460.00
Citizen MSP 55 (300 cps 136col) £575.00
Citizen HQP 40 (24Pin 200cps 80col) £431.25
Citizen HQP 45 (24Pin 200cps 136col) £529.00
NEC P2200 (24Pin 168cps 80col) £379.50
Daisy Wheel Citizen Premier (35cps) £488.75

MODEMS

Nightingale with Commstar rom £90
Pace Linnet V21/23 .... £135
Miracle WS4000 V21/23 .... £160
Pace Series 4 2123S V21/23 .... £255
Miracle WS3000 professional V21/23 .... £290

DISCS

	10	25	50
5.25" DS/QD 80 track	£6.00	£13.00	£22.00
3.5" DS	£13.00	£30.00	£55.00

EDUCATIONAL PROGRAMS

	Tape	5.25" disc	3.5" disc
Typing Tutor	£12.95	£14.95	£15.95
Early Maths	£7.95	£9.95	£10.95
Early Words	£7.95	£9.95	£10.95

NEW NEW NEW NEW NEW

BT FAX MACHINE (group 3 auto reception)
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Phone for best price–we always try to give you the best deal

PINEAPPLE SOFTWARE

Programs for the. BBC model 'B', B+, Master and Master Compact with disc drive

DIAGRAM II

- now also available for ARCHIMEDES

Diagram II is a completely new version of Pineapples popular 'Diagram' drawing software. The new version has a whole host of additional features which make it into the most powerful and yet quick to use drawing program available for the BBC micro. The new features mean that 'Diagram II' can now be used for all types of drawings, not just circuit diagrams. Scale drawings are possible and the facilities for producing circles and rubber banded lines together with the pixel drawing routines make any type of drawing possible. This advert has been produced completely using Diagram II.

Summary of Diagram II features:-

1. Works on all model BBC computers and makes use of Shadow memory if poss.
2. Rapid line drawing routines with automatic joins for circuit diagrams.
3. Rubber band line and circle drawing modes.
4. Makes use of the Acorn GXR rom to produce ellipses, arcs, sectors, chords and flood filling.
5. Pixel drawing mode allows very fine detail to be added.
6. Defined areas of screen may be moved, copied, deleted or saved to disc.
7. On-screen cursor position indication allows scale drawings to be made.
8. Keyboard keys may be defined to print User Defined Characters allowing new character sets to be used.
9. Wordprocessor files may be loaded and formatted into defined areas.
10. Up to 880 UDC's if shadow memory available, 381 without shadow.
11. Compatible with Marconi Trackerball and most makes of 'mouse'.
12. All 'Diagram Utilities' are included.
13. Completely 'scaleable print routines allow any area of the diagram to be printed either horizontally or through 90deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
14. Smooth scrolling over the whole area of the diagram.

Diagram II consists of a set of disc files and a 16k Eprom. The disc is formatted 40T side0 and 80T side2. Please state if this is unsuitable for your system, or if you require a 3.5" Compact disc

DIAGRAM II - £55.00 + vat P & P free

MARCONI TRACKERBALL

For Model 'B' and B+ (with Icon Artmaster)	£ 60.00 + vat
For Master 128 (with Pointer Rom)	£ 60.00 + vat
Bare Trackerball (no software)	£ 49.00 + vat
Pointer Rom (available separately)	£ 12.50 + vat
Trackerball to mouse adapters	£ 8.00 + vat
Postage and Packing on Trackerballs	£ 1.75

All orders sent by return

PCB

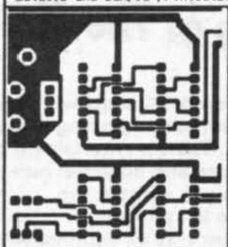
Pineapple's now famous PCB drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

The program is supplied on Eprom and uses a mode 1 screen to display the two sides of the board in red and blue either separately or superimposed. Component layout screens are also produced for a silk screen mask.

The print routines allow a separate printout of each side of the board in an expanded definition high contrast 1:1 or 2:1 scale. The print time is typically about 5 mins. for a 1:1 print of a 7" * 5" board. This program has too many superb features to adequately describe here, so please write or 'phone for more details and sample printouts.

£85.00 + vat

Plotter driver to suit most plotters £ 35.00 +vat



PCB AUTO-ROUTING

This brand new addition to the PCB program greatly increases the power of the software and speeds the design of PCB's even more.

A list of up to 190 connections may be entered in the form of a 'rats nest' and then the computer does the rest! You may specify which side of the board you wish a track to be on or you may leave the choice to the computer, and you may also say whether tracks should be allowed to pass between I.C. pins.

The program is in the form of a second Eprom and full features are available on a standard model 'B.'

Please write or 'phone for full details.

COMPLETE AUTOROUTE PACKAGE (Including manual Eprom) £185.00 + VAT

ADFS Utilities Rom

ADU is an invaluable utility for all ADFS users. It adds over 22 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

New *commands are as follows:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSADFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT, *WIPE

PRICE £ 29.00 + vat

MITEYSPICE — Powerful A.C. & D.C. circuit analyser package - £119.00 +vat with Graphics output. Send for more details

VISA

39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL Tel 01-599 1476

Access

NEW BATTLE OF BRITAIN

FROM DESIGN PEOPLE SOFTWARE!

Battle of Britain is available on cassette or 5¼" disc.

DISC £12.95 + £1.00 p&p

CASSETTE £9.95 + £1.00 p&p

now available

MIDWAY

in the BATTLEGAME SERIES

£12.95

11th August 1940 . . .

Britain stands alone against the German war machine. In July, Adolf Hitler ordered his commanders to prepare plans for the invasion of Britain, named Operation Sealion. The German commanders insisted that they have air superiority over the Channel, or the Royal Navy could destroy the invasion force before it reached the shores of Britain.

BATTLE OF BRITAIN simulates the conflict that ensued. The player takes the place of the commander of the Royal Air Force, whilst the computer takes charge of the German forces. Under your command are the seven sector stations of Fighter Command. You receive reports from your radar stations on the coast, or if these have been bombed out of action, from the Observer Corps. Your forces are replenished from your fighter reserve and by production from aircraft factories — but you will lose both if the factories are bombed.

As if that were enough, bombing raids which penetrate your defences and reach your airfields will wreak havoc. All these and a host of other details are simulated by the Battle of Britain program.

Unlike 'Sink The Bismarck' and 'Tanks', 'Battle of Britain' does not include 'combat sheets' as the numbers of planes involved are so large, though it does use disc overlay techniques to allow a larger program.

Reviews:

"Full marks for simulations like this — an intelligent use of the computer that is never boring and doesn't require you to be a wargaming fanatic to enjoy playing . . . I do believe that many more of you would enjoy playing Battle of Britain than you might suspect . . . I'm eager to see the next in the series!" *A&B Computing, October 1987*

All games are compatible with the BBC B,B+ and MASTER series. All orders will be despatched by return of post.

Design People Software, 77 Grimwade Street, Ipswich, Suffolk, IP4 1LN

4 exciting compilations of the very best programs from the pages of *The Micro User*

TEN of the BEST!

We've brought together the most popular listings which have been published over the last year and created four packages each devoted to a particular subject area. There's entertaining games, handy utilities, clever graphics utilities and powerful ram and disc utilities – all ready for you to put to use without the need for any typing in! You can also list and adapt nearly all the programs – an excellent way to improve your programming skills.

Ten of the Best Ram and Disc Utilities

B+ ✓
M ✓

Ram Arrays – Extend the memory available for your arrays in Basic.
Printer Buffer – No more waiting for your printer to finish printing with this great utility.
Prommer – Put your own Basic programs in rom for instant access.
Disabler – Having problems with duplicate rom commands? Cancel out roms with this utility.
MOT – Keep your discs in top magnetic condition and rescue corrupted programs.
Disc Copy – No more single file copies - this utility makes use of the whole memory.
Disc Catalog – Keep track of your disc files with this excellent cataloguing program.
Disc Protect – Professional disc protection is yours using this excellent utility.
Dual Catalog – Get 56 files on one disc surface with this utility
Safe Save – Prevent overwriting a backup file with this clever checking routine.

Disc price: £4.95

Ten of the Best Graphics Utilities

MicroWorks – Create impressive Mode 4 screens with this superb graphics program.
Pixel Editor – Fine-tune screen pictures in any mode with this excellent editor.
Flood Fill – Fill screen areas with solid colour at remarkable speed.
Mode 7 Dump – Print out your Mode 7 screens onto any Epson-compatible printer.
Slim Characters – Get 40 characters per line in Modes 2 and 5.
Special Fonts – Display 192 fonts on screen with this easy-to-use utility.
Printer Control – Modify your printer styles easily from your wordprocessor.
Dual Screens – Give your programs the professional look with this double-screen display.
Characters – Create your own character sets with this useful utility.
Charprint – Use this clever routine to print your own character sets to Epson printers.

B+ ✓
M ✗

Disc price: £4.95

Buy all four discs for
£17.80
and save
£2!

Ten of the Best Games

Dino – Ride the gobblosaurus past all the perils in this magnificent fast-action game.
Hunkie Egg – Clamber up the ladders and run along the levels to gather up the eggs.
Diamond Quest – Collect all the diamonds in this superb arcade adventure.
Stellar Rescue – Defeat the powerful gravity to land your spacecraft in one piece.
Fruit Machine – Test your skill and luck on the one-armed bandit with this addictive simulation.
Karate Warrior – Delve into the mysteries of the martial arts as you aim to get a black belt.
Maltese Cross – Try your hand against the computer in this classic domino game.
Othello – Entertain yourself for hours with this very popular oriental board game on your micro.
Witch Hunt – Help Olive search the maze to find the 42 keys of Transportal.
Soccer Manager – Take on the soccer club's top job in this gripping game of skill.

B+ ✓
M ✓

Disc price: £4.95
(Also available on tape for only ***£3.95****)*

Ten of the Best Utilities

Text Compressor – Use this excellent utility to reduce the space held by your strings.
Variable Compressor – Reduce the size of your variables automatically to save space and improve speed.
Line Compressor – Save space in your programs by creating multi-statement lines.
BOS Editor – Make editing your Basic program easy with this on-screen editor.
Basdat – Convert disc files into Basic data statements and add the resultant lines automatically.
Basic Repairer – Rescue your programs after the Bad program error with this useful little utility.
Line Editor – Use a single-line word processor in your INPUT statements without changing your programs.
Circles – Use this fast and powerful routine to quickly draw filled and unfilled circles.
Events – Make your programs respond to real-time events with interrupt-driven Basic routines.
Stripper – Remove the line numbers from your Basic programs to allow editing within a word processor.

Disc price: £4.95

B+ ✓
M ✗

PLUS

Every package comes with an easy-to-use machine code version of the Get It Right checksum to enable you to check listings you've typed in.

At only £4.95 each the Ten of the Best compilations represent superb value for money. But you can obtain all four for £17.80 and save £2!

Don't delay – turn to the order form on page 159 to take advantage of this excellent offer.

3.88(3)

U·P·D·A·T·E

DTI rapped over schools software

THE Educational Software Publishers Forum has written to the DTI and DES expressing concern over "the lack of a clear government strategy for the future provision of educational computer software in schools – in the light of a substantial commitment to promote leading-edge computer hardware in education".

Background to the publishers' concern is the DES educational support grant for information technology which provides LEAs with £8.5 million for hardware acquisition and £10.5 million for teacher training "but nothing for software". This is due to software currently being covered by DTI funds – but ESPF fears this three-year-old support scheme could end at any time with no replacement in view.

"Even if the scheme continues at its present rate this will only represent five per cent of the total input from central sources and it does not reflect the importance of software generally or the spending patterns that industry and commerce apply to computer projects", says ESPF. "The lack of support will encourage a low opinion of the value of software and encourage unauthorised copying in schools".

Schools are not always prepared to pay realistic prices for software and the limited nature of the market means development costs of £15,000 to £150,000 per package will rarely be covered by UK sales, the report adds.

The publishers say they don't want direct government support for themselves. "However steps need to be taken to make sure that schools spend enough on software – investing £50 to £100 per keyboard per year. Schools have very limited resources but this is precisely the area that the government should be targeting its funds to encourage LEAs and schools to spend more on software".

An additional major problem is the transition from 8 bit to 16/32 bit micros in schools. "It is not clear what central government is doing to promote development around the new computers", says the report. "It is naive to expect industry to invest in developments from which it can see no realistic possibility of a return".

Archimedes chosen

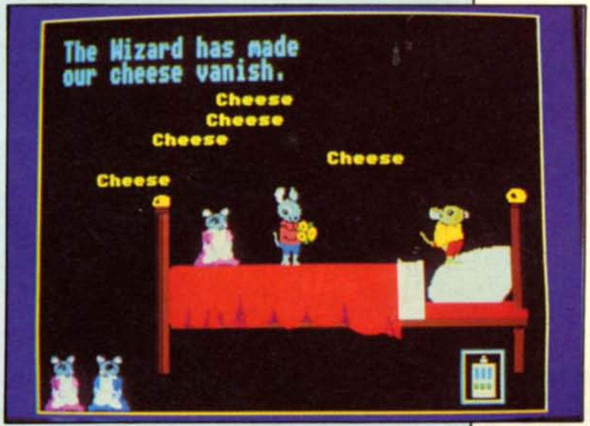
SOUTH Tyneside education authority has adopted the Archimedes as the standard micro for all its schools.

"These machines offer us a high degree of familiarity with the existing and still very useful BBC Micros that have served us so well and reliably over the past seven years", said educational technology advisor Laurie Decyk. "It means teachers and pupils will feel at home very quickly".

Having a standard machine will also enable maintenance, training and licensing arrangements for applications software to be handled on a central basis. "We'll be able to make use of highly professional audio and image processing techniques in a way we only dreamt of two years ago", said Decyk.

Making perfect . . .

AN aural practice program to help pupils studying for the Royal Schools of Music examinations has been released by Perfect Forth Software (04427 6311). Perfect Forth Aural for the BBC Micro and Master solves the problem of students being unable to practise between lessons due to lack of a skilled pianist.



The Wizard has made our cheese vanish.

Cheese

Cheese

Cheese

Cheese

Cheese

An example of the detailed graphics from the Land of Droom

Wizards and maths

A NEW educational package for the Archimedes, structured to integrate with a school's curriculum, has been released by Resource (0302 63800).

Droom is a text and graphics adventure game that features dragons, trolls, wizards, fairies and witches. The story revolves around Princess Arminda who has been kidnapped by the wicked dragon Droom. Children have to rescue the princess and restore her true love, Prince Henry, who has been turned into a frog.

Although the program is set in the context of a story, progression depends upon the solution of a series of mathematical problems and puzzles. Droom is claimed to be flexible in use in the classroom. Pupils need not complete the adventure in one session as they can leave and re-enter it at any stage.

Word processing for the primary school

Program: PromptWriter
Price: £3
Supplier: MESU, Unit 6, Sir William Lyons Road, Science Park, University of Warwick, Coventry CV4 7EZ.
Tel: 02034 16994

PROMPTWRITER is an updated software package which has revitalised the two earlier word processors produced by the Micro Electronics Programme. The MEP was set up in 1983 on a regional basis and initially provided tape packages of wide variety and quality. This trail-blazing activity was never totally successful in later years although there were some significant projects.

The MEP has now been superseded by the Micro-Electronics Education Support Unit – MESU – and it is responsible for the presentation of the PromptWriter package which contains three discs, a manual and 18 double-sided overlays for A4 or A3 sized Concept Keyboards.

On loading the first disc it is possible to call up either Prompt or Writer by typing the required initial letter. Having done this you can start writing almost immediately. If there are any difficulties the straightforward, well-illustrated manual will cater for all but the most intricate problems.

Prompt is aimed at younger children or those who have difficulty presenting their thoughts cogently. Writer on the other hand is able to be used throughout the primary age range.

Disc two contains the utilities and files for the Concept Keyboard overlays which will be of great benefit to the younger or less able pupils. A wide variety of overlays are available: Firstly individual letters, then individual groups of words and pictures. Next there are word exercises and problems putting sentences in correct order. Finally

---

Through the selection jungle

DEGREE COURSE GUIDE 1987/88
MATHEMATICS AND STATISTICS
IN UK UNIVERSITIES, POLYTECHNICS AND COLLEGES
INTRODUCTION TO THE SUBJECT · COMPARISON OF COURSES · ENTRANCE REQUIREMENTS · CAREER PROSPECTS
M D DAMPIER
CRAC

Program: Degree Course Guides
Price: £3.50 each
Supplier: Hobsons, Bateman Street, Cambridge CB2 1LZ.
Tel: 0223 354551

SOONER or later you get to notice that the educational ladder appears to have a number of rungs missing at crucial points. When you move up from primary to secondary school, for example, it seems an enormous jump from being top class in the school to the littlest fish in a big and pretty frightening pond.

But the most awesome jump of all comes when you have to decide on which course to take at which college or university when you're just touching 18 – an adult with L plates on.

Not only are there nearly 50 universities in the UK, there are polys, colleges of further education, and other institutions all offering degrees of every shape and size in courses ranging from astronomy to zoology.

It's a really bewildering choice, not least when it dawns on you that you're also going to be left to your own devices for a place to live, managing your own bank account and much, much more. In

Points for:

- **Coveres 2,000 + institutions**
- **Gives quick access to details**

...against:

- **Only searches for course/institution**
- **Doesn't give all the facts**

some sentences to begin or finish a story are presented to help stimulate creative writing.

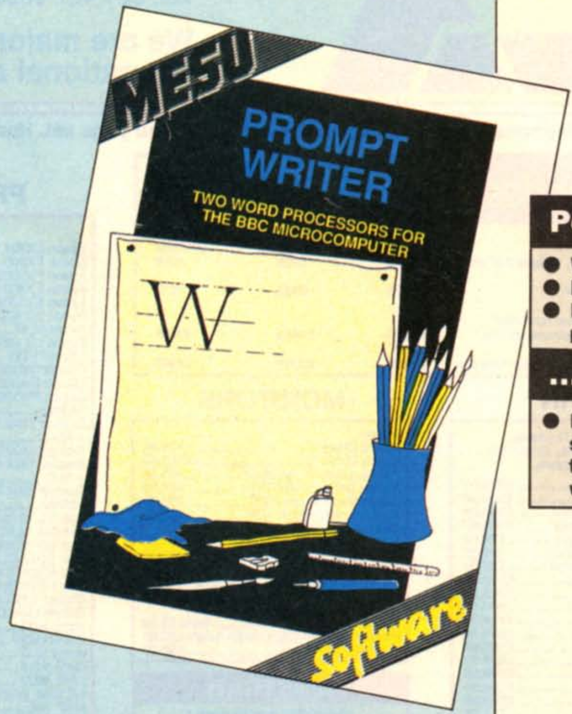
The third disc contains sample files that can be loaded to give examples of work or for presenting the pupils with Cloze procedure exercises. Finally, at the back of the manual, are samples of the various types of print available.

The larger print sizes are based on those developed by Paul Blenkholm of the Research Centre for the Physically Handicapped. One slight criticism here is the print speed, which is very slow. Also if used for any length of time the printer ribbons very quickly deteriorate. The original idea for Prompt came from Bob Dyke and for Writer from Anita Straker.

The package costs £3, or £2.50 each for four or more. I feel it is a worthwhile and essential component for any school wishing to establish a computer software library. The price level means that it could be bought by all schools or on a county basis.

At present there are a number of excellent word processors on the market, particularly impressive being Tedimen's Folio and Sherston's Typesetter. Prompt and Writer are less sophisticated and basic but are also simpler to use and written work can be produced with little or no preparation. The manual, too, is clear, precise and encouraging for the non-specialist teacher.

Gareth Gillingham



Points for:

- Very easy to use
- Has utilities disc
- Low-cost word processor

...against:

- Less sophisticated than some other word processors

---

such circumstances, anything that can help you pick your way out of the blackboard jungle into the college and university jungle would be a boon from heaven.

And that's just what this guide on a disc or rather string of discs, does to perfection. It's an excellent browser for the sixth former in pursuit of any one of more than 2,000 courses in colleges, universities and institutions all over the UK.

Clearly, the package can't offer minute details of each and every course in the land, but its sensible menu-driven system – which, as far as I can determine, is pretty indestructible – offers a reasonable level of introductory information on each course, or group of courses.

At the highest menu level you are invited to choose between one of 23 subjects or groups of subjects – excluding medicine and dentistry. Once you've homed in on a particular subject area you are presented with a rolling list of the institutions which offer the course you're interested in.

At the next level, you choose a particular institution and you can then opt for the following:

- *General details:* You're given the UCCA number of the course, who validates it, the kind of course(s), the length, and whether recognition by a professional body is involved. Sensibly, the guide at this point tells you to consult the appropriate printed guide for fuller details.
- *Transfer details:* In this category, information is offered on whether you can transfer within the institution, what happens if you fail to enter the Honours part of the course, and whether you can transfer to the course from another institution.
- *Entrance and selection:* These include normal entry qualifications required, if there is a standard offer made by the institution, whether candidates are interviewed, and, if so, in what circumstances, and whether mature applicants or potential students with unorthodox qualifications are considered.

All in all, an invaluable use of the computer. The only grouse is that it would have been nice to access the information on the basis of different criteria from course then institution. But then I'd have nothing to grumble at. And that would never do.

Rex Last

TABLE **6** **Selection procedure**

Key:
A: Offers of places made on basis of application form
B: Those offered places invited for informal visit
C: Offers of places made after interview
D: Those considered suitable candidates interviewed
E: Those considered borderline candidates interviewed
F: Mature candidates and special cases interviewed

Institution	*Title of course*	*A*	*B*	*C*	*D*	*E*	*F*
Aberdeen	Mathematics	•	•				•
Bath	Mathematical sciences			•	•		
	Mathematics			•	•		
	Mathematics and computing			•	•		
	Statistics			•	•		
Birmingham	Mathematics	•	•	•			•
	Mathematics and computer science	•	•	•			•
	Pure mathematics	•	•				
Bradford	Mathematics	•	•				•
	Mathematics and statistics	•	•				•
Brighton Poly	Combined sciences: mathematics	•	•				•
	Combined sciences: statistics	•	•				•
	Mathematics for decision making	•	•			•	•
Bristol	Computer science with mathematics	•	•			•	•

Some of the courses available

Computaccount (UK) Ltd
11 High Street, Harborne
Birmingham B17 9NT
Tel: 021 427 9898

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Archimedes

THE NEW RISC COMPUTER FROM ACORN. A VERY FAST 32 BIT MACHINE, SPECIFICALLY AIMED AT THE EDUCATION MARKET COMPATIBLE WITH MOST EXISTING BBC SOFTWARE

	Base model	+ Mono monitor	+ Colour monitor
Archimedes 305 *512k RAM, 512K ROM, 1Mbyte 3.5" drive*	£699	£749	£899
Archimedes 310 *As 305 but 1024k RAM*	£775	£825	£975
Archimedes 410 *As 310 but with hard disc controller floating point option, coprocessor bus.*	£1399	£1449	£1599
Archimedes 440 As 410 but 4048k RAM 20Mbyte hard disc	£2299	£2349	£2499

ACORN

NEW MASTER COMPACT series. Standard system is 128k, single 3.5 inch drive, bundled software.

Compact entry system	£349.00
Compact TV system	£359.00
Compact with mono monitor	£389.00
Compact with colour monitor	£529.00
RS 232 interface for compact	£26.00
Extra 3.5in drive for compact	£99.00
PAL TV adaptor for compact	£26.00
Master 128	£379.00
Master ET	£305.00
Master econet module	£43.47
Turbo upgrade	£108.00
64K upgrade kit	£34.74
Master 512K upgrade	£199.00
Level 1 file service	£86.00
Level 2 file service	£199.00
File Store E01	£799.00
File Store E02 (20mb)	£600.95
Eprom cartridges	£11.95
Acorn DNFS kit	£82.60
1770 upgrade kit	£43.42
ADFS ROM	£26.04
ATPL Sideways RAM/ROM board	£39.00
CONCEPT Keyboard	£124.95
View manual	£10.00
Viewsheet manual	£10.00

DISC DRIVES

Opus 5802 400k DS 40/80 track	£109.00
Opus 5802DB dual 400k DS40/80 track	£205.00
Opus 5802D dual 400k DS 40/80 with PSU	£250.00
Opus DDOS kit	£59.95
Pace PSD3P 400k 40/80T with PSU	£144.0
Pace PDD3P dual 400k 40/80T with PSU	£280.00
Akhter MD802E dual 400k DS 40/80T mounted in monitor stand	£285.00
Cumana CSX100 100k SS 40T	£99.00
Cumana CS100 100k SS 40T with PSU	£129.00
Cumana CS400S 400k DS 40/80T with PSU	£152.00
Cumana CD800S dual 400k SS 40T with PSU	£295.00
Cumana CS354 SS 3.5" with PSU	£121.70
Cumana CD358 DS 3.5" with PSU	£210.00
Cuman CCD2000S 3.5" + 5.25" with PSU	£282.17

MONITORS

Mono	
Sanyo DM4112	£79.95
Sanyo DM9112	£126.00
Philips green Hi-res 7502	£85.00
Philips amber Hi-res 7522	£85.00
Zenith green Hi-res 1230	£85.00
Zenith amber Hi-res 1220	£85.00
Colour	
Microvitec std-res 1431	£191.00
Microvitec med-res 1451	£229.00
Microvitec hi-res 1441	£399.00
Philips 8833 RGB Med-res + composite video	£251.00
Monitor cables (state type required)	from £3.50
Master Monitor bridge single height	£25.00
double height	£28.00

AMSTRAD

*** New 1640 now in stock ***

Amstrad 1640
Enhanced colour display

Single 360k floppy drive	£799.00
Twin 360k floppy drives	£899.00
Single 360k floppy drive + 20Mbyte hard disc drive	£1199.00
Colour Twin floppies	£649.00
20Mb Hard Drive	£260.00
PCW 8256	£299.00
PCW 8512	£399.00
PCW 9512 with Daisywheel printer	£499.00
Amstrad 3" discs box of 10	£28.00

SOFTWARE:
Call for full list of IBM Compatible and Amstrad software

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Epson FX 100/105 Sheet Feeder	£139.00
Brother HR sheet feeder	£209.00
Epson MX/RX/FX 80 Ribbons	£3.75
Epson MX/RX/FX 100 Ribbons	£4.50
Canon PW 1080/1156 Ribbons	£5.00
Taxan Kaga KP810 Ribbons	£5.00
Citizen printer ribbons	from £3.99
All Epson Spares available	£POA

Massive range of other compatible ribbons available

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Lots for a low price in DTP

Product: Pixel Perfect
Price: £29.50 Art Pack, £12.50 Font Discs £9.50 each
Supplier: AVP, School Hill Centre, Chepstow, Gwent NP6 5PH.
Tel: 02912 5439

The Complete Desktop Publishing System
PIXEL
PERFECT
Printpack
AVP

PIXEL Perfect is a desktop publishing package of almost awesome proportions yet it will fit into any BBC B. Pages are created directly on to a Mode 0 screen and this should meet every conceivable need of the most ardent DTP enthusiast – but there is a price to pay. The package works around a Page Disc that contains various routes to other features. When you start up you are presented with a view of about 20 per cent of the total page – the maximum amount you can do any practical work on at once – so your page must be dealt with as six slightly overlapping sections.

In this initial mode you can fill various areas with patterns, draw pretty borders, create any regular polygon and type text into the boxes. However, to scroll the page, use various fonts, print, import artwork, cut and paste and so on you must start the tedious job of disc swapping.

Despite this, the available features deserve closer attention. Text is at the heart of any DTP package and this one offers you two main modes of input. The first is text formatting where you create a box of the size and position of your choice. This uses a rather complex set of keys, the arrow keys for size and z,x,* and ? for movement. I found this consistently awkward and am sure that there must be a better solution.

It is in this area that the package falls down. Once your box is created you type on to an input line at the base of the screen. At the end of each you must press Return and the line is placed in the box. The problems with this are that there is no audible warning when you reach the end of the line, and no automatic entry of word-wrap – all very irritating.

Neither is there any warning when you approach the bottom of the box – further lines are just printed over the existing bottom line.

The second method of text entry is to use a font. This allows you a great degree of flexibility, as size may be defined and text may be entered horizontally or vertically. Three are supplied with the initial package and others can be bought or you can design your own.

Drawing your letters is slow but there is a faster option which only works in one size. Creating page-wide headlines is not an easy task as the page has to be scrolled half-way through the

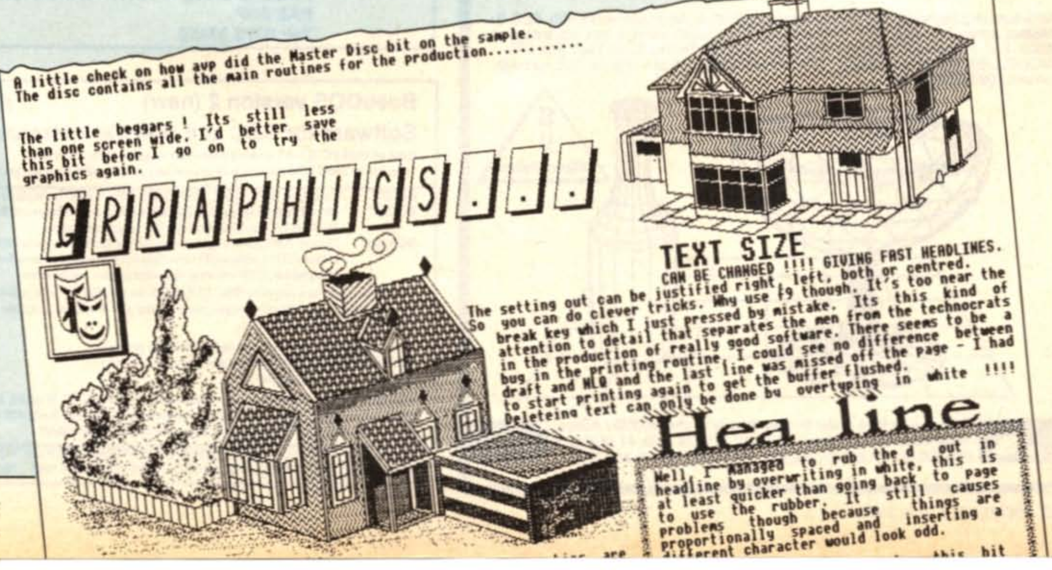
Turn to Page 68 ▶

Points for:

- Lots of useful features
- Excellent graphics facilities
- Can use any saved screens

...against:

- Too much disc swapping
- Easy to lose bits of text
- Tricky to use



A little check on how avp did the Master Disc bit on the sample.
The disc contains all the main routines for the production............

The little beggars ! Its still less
than one screen wide. I'd better save
this bit befor I go on to try the
graphics again.

TEXT SIZE
CAN BE CHANGED !!!! GIVING FAST HEADLINES.
The setting out can be justified right, left, both or centred.
So you can do clever tricks. Why use f9 though. It's too near the
break key which I just pressed by mistake. Its this kind of
attention to detail that separates the men from the technocrats
in the production of really good software. There seems to be a
bug in the printing routine. I could see no difference between
draft and NLQ and the last line was missed off the page - I had
to start printing again to get the buffer flushed.
Deleteing text can only be done by overtyping in white !!!!

Well, I managed to rub the d out in
headline by overwriting in white, this is
at least quicker than going back to page
to use the rubber. It still causes
problems though because things are
proportionally spaced and inserting a
different character would look odd.

A printout from a trial run on Pixel Perfect

◀ From Page 67

process and if a letter extends over the edge of the screen that part is lost.

The graphics capabilities of Pixel Perfect are excellent. Given the disc swapping, the facilities are easy to use and a vast array of effects can be achieved. The art pack is available separately and contains icons, borders and useful maps as well as some less useful graphics such as a smouldering cigarette.

Pictures can be cut and pasted, magnified and altered, as well as reflected, twisted, inverted, enlarged and manipulated as much as you want. There is a facility to create your own art work, but this is rather basic.

A more useful and exciting facility is the easy import of whole screens created using any package in other graphics modes. The conversion to Mode 0 and grey shading is faultless and shades may be inverted. The printout routine is very fast and makes page viewing utilities redundant.

Here is a DTP package that does what you want – but there are disadvantages. The main one is the disc swapping. Things could be improved if the discs were not protected, as it would allow you to set up a double drive with most of what you wanted immediately accessible. Also the lack of backup copies is bound to cause the harassed teacher problems with six discs floating around, although AVP does provide a quick and efficient replacement service.

Making the quick changes you might need is complex and could require the slow major exercise of re-composing a page. You can overcome this by importing text from other packages but this would diminish the free-wheeling, hold the front page activities that DTP can promote.

Other annoying features do exist, such as the need for regular saving – scroll an unsaved section of a page and you will lose it. There is also no built-in provision for a mouse which might have helped with box creation. AVP thinks that users could easily adapt the package to use a joystick.

A network version is available on request with the price negotiable regarding the number of stations you have – a nice touch. Other extensions are in the pipeline too.

If you want a comprehensive package and have a fairly long lead time for your newsletters, magazines and so on, then Pixel Perfect could be the answer – especially with its low entry price. Programmers take note that utilities are included to use the fonts and graphics to jazz up your own programs in any mode.

As a DTP package for education you will need to think very carefully, especially for the lower age range. But as a teacher's tool for producing worksheets it could prove invaluable.

Marshal Anderson

The bottom line...

Rather difficult for the average pupil, but ideal for producing worksheets.

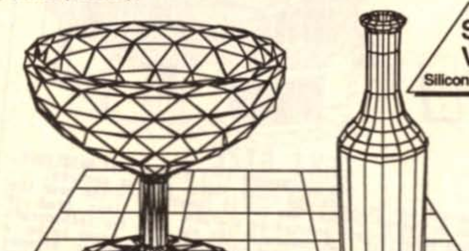
REALTIME SOLIDS MODELLER

Reviews of the original REALTIME GRAPHICS SYSTEM:
"there is no other software to rival it"-Beebug.
"there is no better package" -Acorn User.

The complete 3D Solids/Wireframe package for architectural design, art design, interior design, teaching CDT and 3D geometry, molecular modelling, mathematical plots, scientific processing and high speed flicker-free 3D animation. Unlike other packages this system can perform full colour hidden-surface removal at high speed.

The package consists of a 32k Realtime Graphics Language rom with 52 star commands; 6 discs providing 3D CAD, Plotter drivers for all plotters including HP-GL and Plotmate, Demonstrations, Applications facilities and Database Libraries; and a 150 page manual. Design facilities include menu driven 3D Solid/Wireframe Editors to design objects with lines and surfaces, create symmetrical objects by Sweeping or Extruding simple sections, use objects as building blocks to create more complex objects which in turn may be used as building blocks, specify individual surface and line colours for multi-coloured objects, dynamic 3D viewing in any graphics screen mode and a Data convertor for interfacing to other CAD systems and applications.

Minimum requirements: BBC B/keyboard/single drive. Also compatible with BBC B+, Master series, all versions of DFS & DDFS. The system will also take advantage of a 6502 2nd Processor/Turbo or AMX/QUEST Mouse. Prices: REALTIME SOLIDS MODELLER: £89.95 (inclusive); SOLIDS UPGRADE (return original RGL rom with order): £39.95 (inclusive).



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B= BBC, E= Electron and C= Concept keyboard

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In fact BeebDOS is probably the fastest and most powerful BBC/IBM PC file transfer method available and no cables or serial connections are required.

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Inclusive

BBC double density diskette formats supported are Acorn ADFS, Watford, Solidisk, OPUS DDOS and UDM. Acorn single density DFS is only supported when running BeebDOS on an IBM AT or XT286 with a 360k disk drive. Please send or phone for an information sheet

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Style plus fun minus tedium equals success

Wyn Middleton points the way to mellow maths

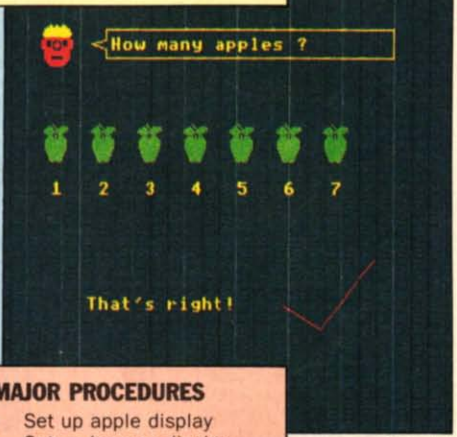
TEACHING young children to read and write numbers needs infinite patience, an attribute the BBC Micro possesses in abundance. It never gets tired or angry and, as long as the job it's trying to do is simple, it can carry the task out very successfully.

Counting with Charlie is a simple entertaining way to drill in the concepts of numbers for children who can recognise the figures one to nine. Type in the listing, and ensure there are no typing errors with Get it Right!

When run the program asks you to press the number key that matches the number of fruit shown on the screen. Charlie keeps a track of the number of right answers.

MAJOR VARIABLES

R	Number of fruit to display
RR	Last number of fruit chosen
score	Number of correct answers
t	Time to pause in seconds
C%	Colour of fruit
V%	Volume of sound
P$	Current fruit being displayed
s$	What Charlie says



How many apples ?

That's right!

Counting the fruit

MAJOR PROCEDURES

apples	Set up apple display
bananas	Set up banana display
charlie	Draw Charlie on the screen
end	Display the end message
jingle	Play the merry jingle
pause	Wait for a while
right	Tell player he is right
say	Display a speech bubble
setup	Prepare main characters
strawberries	Set up strawberry display
title	Put title page up
wrong	Tell player he is wrong

```
   10 REM Counting with Charlie
   20 REM by Wyn Middleton
   30 REM (c) The Micro User
   40 ON ERROR MODE7:REPORT:PRINT" at li
ne ";ERL:END
   50 MODE1:VDU19,1,5;0;
   60 VDU23;8202;0;0;0;:*FX11
   70 PROCsetup:PROCtitle
   80 REPEAT
   90 FOR N%=1 TO 4
  100 FOR Z%=1 TO 3:CLS
  110 IF Z%=1 PROCapples
  120 IF Z%=2 PROCbananas
  130 IF Z%=3 PROCstrawberries
  140 PROCcharlie(4,3):COLOUR2
  150 PROCsay("How many "+P$+"?")
  160 RR=R:REPEAT R=RND(9)
  170 UNTIL R<>RR:VDU19,3,C%;0;
  180 COLOUR3:FOR P%=1 TO R
  190 VDU31P%*4,10,224,225,226
  200 VDU31P%*4,11,227,228,229
  210 VDU31P%*4,12,230,231,232:NEXT
  220 REPEAT G%=GET-48
  230 UNTIL G%>0 AND G%<11
  240 IF G%=R PROCright ELSE PROCwrong
  250 PROCcount(R):NEXT:NEXT:PROCend
  260 UNTIL FALSE:END
  270 DEF PROCsay(s$)
  280 LOCAL L%:L%=LENs$*32
  290 PRINTTAB(10,4)s$;
  300 GCOL0,2:MOVE310,850
  310 DRAW318+L%,850:DRAW318+L%,915
  320 DRAW310,915:DRAW310,890
  330 DRAW270,880:DRAW310,870
  340 DRAW310,850:ENDPROC
  350 DEF PROCapples
  360 VDU&E017;0;&F03;&71F;&300;
  370 VDU&E117;&2040;&CF93;&C7FF;&D710;
  380 VDU&E217;0;&F0F0;&C0;&8000;
  390 VDU&E317;&F07;&F0F;&F0F;&707;
  400 VDU&E417;&FFD7;-1;-1;-1;
  410 VDU&E517;&E0C0;&E0E0;&E0E0;&C0C0;
  420 VDU&E617;&303;&101;0;0;
  430 VDU&E717;-1;-1;&EE;0;
  440 VDU&E817;&8080;0;0;0;
  450 C%=2:P$="apples":ENDPROC
  460 DEF PROCbananas
  470 VDU&E017;0;0;0;0;
  480 VDU&E117;&101;0;0;&100;
  490 VDU&E217;&FFC0;&367F;&D050;&B0D0;
  500 VDU&E317;0;0;0;&100;
  510 VDU&E417;&301;&603;&3D0E;&DF7B;
  520 VDU&E517;&60A0;&E060;&C0C0;&8080;
  530 VDU&E617;&7E0F;&7F81;&F;0;
  540 VDU&E717;&3EDF;&E0FC;&80;0;
  550 VDU&E817;0;0;0;0;
  560 C%=3:P$="bananas":ENDPROC
  570 DEF PROCstrawberries
  580 VDU&E017;0;&300;&1F0F;&3F1F;
  590 VDU&E117;&1008;&FF10;&BFFF;&FFDD;
  600 VDU&E217;0;&C000;&F8F0;&FCF8;
  610 VDU&E317;&3F3F;&3F3B;&1F1F;&F0F;
  620 VDU&E417;&F7FF;&DFFF;&FBFF;&FFBF;
  630 VDU&E517;&DCFC;&FCFC;&F8D8;&F0F0;
  640 VDU&E617;&307;1;0;0;
  650 VDU&E717;&EFFF;&FBFF;&3C7E;&18;
  660 VDU&E817;&C0E0;&80;0;0;
  670 C%=1:P$="strawberries":ENDPROC
  680 DEF PROCend:CLS
  690 PROCjingle:PROCcharlie(4,3)
  700 PROCsay("You got "+STR$score+" out
of  12")
  710 PROCpause(2):COLOUR2:*FX21
  720 PRINTTAB(7,14)"Press a key...";
  730 Z%=GET:PROCjingle:ENDPROC
  740 DEF PROCcharlie(X%,Y%)
  750 COLOUR2:VDU31X%Y%,233,234,235
  760 COLOUR5:VDU31X%Y%+1,236,237,238
  770 VDU31X%Y%+2,239,240,241:ENDPROC
  780 DEFPROCsetup
  790 VDU&E917;&100;&1F07;&3F1F;&1F3F;
  800 VDU&EA17;&9900;-1;-1;-1;
  810 VDU&EB17;&8000;&F8E0;&FCF8;&F8FC;
  820 VDU&EC17;&781F;&7878;&7F78;&1F1F;
  830 VDU&ED17;&C3FF;&BD99;&99BD;&FFC3;
  840 VDU&EE17;&1EF8;&1E1E;&FE1E;&F8F8;
  850 VDU&EF17;&1F1F;&1F1F;&70F;&103;
  860 VDU&F017;-1;0;-1;-1;
```

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```
  870 VDU&F117;&F8F8;&F8F8;&E0F0;&C0;
  880 ENVELOPE1,0,0,0,0,0,0,0,126,-4,0,-
2,126,95
  890 V%=-8:ENDPROC
  900 DEF PROCtitle:CLS
  910 COLOUR1:COLOUR130
  920 PRINTTAB(12,5)"C O U N T I N G"
  930 PRINTTAB(16,7)"W I T H"
  940 PRINTTAB(13,9)"C H A R L I E"
  950 COLOUR128:PROCcharlie(18,13)
  960 COLOUR2:PROCpause(4)
  970 PRINTTAB(11,21)"Press a key...";
  980 Z%=GET:CLS:score=0:R=0
  990 ENDPROC
 1000 DEFPROCright
 1010 GCOL 0,1:MOVE 800,300
 1020 DRAW 900,250:DRAW 1050,400
 1030 COLOUR2:PROCjingle
 1040 PRINTTAB(8,22)"That's right!"
 1050 PROCpause(2):score=score+1
 1060 ENDPROC
 1070 DEF PROCwrong
 1080 LOCAL @%:GCOL 0,1
 1090 MOVE 850,400:DRAW 1050,200
 1100 MOVE 850,200:DRAW 1050,400
 1110 COLOUR2:PRINTTAB(0,22)"No, there a
re "R,SPC1P$"."
 1120 SOUND1,V%,10,5:SOUND2,V%,15,5
 1130 SOUND1,V%,1,6:SOUND2,V%,6,6
 1140 PROCpause(2):ENDPROC
 1150 DEF PROCcount(N%)
 1160 LOCAL C%,@%:FOR C%=1 TO N%
 1170 PRINTTAB(C%*4+1,14)C%
 1180 SOUND1,1,C%*10+40,5
 1190 PROCpause(.5):NEXT:ENDPROC
 1200 DEF PROCjingle
 1210 RESTORE:LOCAL D%,N%,P%
 1220 FOR N%=1 TO 10:READ P%,D%
 1230 SOUND 1,1,P%,D%:NEXT:ENDPROC
 1240 DEF PROCpause(t)
 1250 LOCAL T%:T%=TIME+t*100
 1260 REPEAT UNTIL TIME>T%:ENDPROC
 1270 DATA100,1,110,1,120,1,130,1,140,1
 1280 DATA150,4,120,2,110,2,100,2,120,3
```

Get it right!

```
  10 =    0 0 | 230 = 4910 3 | 450 = 732B D | 670 = 373F 4 |  890 = 75B2 7 | 1110 = CA6C 8
  20 =    0 0 | 240 = 593D 1 | 460 = 2982 8 | 680 =  26B 0 |  900 = DFBA C | 1120 = F216 2
  30 =    0 0 | 250 = 1537 2 | 470 =  FBE 3 | 690 = 1EA1 1 |  910 = 5189 4 | 1130 = 4F50 C
  40 = BC2B B | 260 = DADE D | 480 = CC60 8 | 700 = 6FDC 1 |  920 =  9D6 C | 1140 = 325A A
  50 = AA05 9 | 270 = 5049 4 | 490 = D9D0 8 | 710 = 4625 6 |  930 = C138 3 | 1150 = D562 3
  60 = D90A 3 | 280 = CAB4 A | 500 = 146A 4 | 720 =  69D D |  940 = A096 B | 1160 = E007 1
  70 = 5EDD 9 | 290 = EF20 9 | 510 = 84E0 C | 730 = D4BF 2 |  950 = C8EA D | 1170 = 5046 B
  80 = BFBA E | 300 = 7BB3 3 | 520 = 71B0 3 | 740 =  439 E |  960 = 7CD2 F | 1180 = 7EC9 A
  90 = 11D1 D | 310 = A43B 2 | 530 = E0ED B | 750 = 9974 E |  970 = 3EF8 F | 1190 = 8763 6
 100 = C765 5 | 320 = 6CBB 7 | 540 = 6B40 2 | 760 = BE26 B |  980 =  898 0 | 1200 = 2638 5
 110 = 77BE 9 | 330 = 8A39 9 | 550 = 1416 8 | 770 = 97F9 8 |  990 = ED0F 6 | 1210 = 4B2D 9
 120 = AF79 6 | 340 = B7BD 2 | 560 = C389 0 | 780 = 2AA8 C | 1000 = E053 7 | 1220 = 327A 2
 130 = A90E F | 350 = C8DF 0 | 570 = 69F5 8 | 790 = 402A 0 | 1010 = 421D 8 | 1230 = 2CBF 4
 140 = DA43 4 | 360 =  4ED C | 580 = 61C9 6 | 800 = 945D D | 1020 = 62F6 9 | 1240 = AD59 6
 150 = 5685 F | 370 = D6F0 C | 590 = B5C9 0 | 810 = E70C 9 | 1030 = 9502 F | 1250 = 93A0 0
 160 = 2FAA C | 380 = 26E9 7 | 600 = E013 B | 820 =  A57 E | 1040 = 7EB1 7 | 1260 = B6C9 7
 170 = F65C B | 390 = FC14 0 | 610 = 946A C | 830 = FE8C 4 | 1050 = BA72 3 | 1270 = 2D2C B
 180 =  F52 A | 400 = 78A3 9 | 620 = 1F1F D | 840 = 63B9 B | 1060 = ED0F 5 | 1280 = 55BB 3
 190 = 6C34 8 | 410 = 9C6C A | 630 = 800D C | 850 = D4F6 8 | 1070 = 42FA 1 |
 200 = D486 B | 420 = ABAD C | 640 = B059 A | 860 = C206 B | 1080 = B58A 3 |
 210 = CDC7 8 | 430 = ECA1 A | 650 = 466F 0 | 870 = B61A 9 | 1090 = DB84 7 |
 220 = 6B56 9 | 440 = D255 6 | 660 = ABA4 C | 880 = D739 2 | 1100 = 6243 D |
```

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PROGRAM Library No. 15

Compiled by Steve Turnbull

HERE's another assortment of programming goodies. There's a pair of routines to convert a string to upper case and search the converted string for a second string. For those working with the partially-sighted there is a superb standalone routine to produce double height Mode 7 characters from normal printing.

We have yet another machine code print routine, a month planner for personal organisers and an aid for figuring out which Ascii value is needed to produce which teletext graphics character.

Title: Double Height
Language: 6502
Author: Rob Payne

There have been plenty of programs for printing characters in double height, but most involve a procedure output. This routine allows you to use normal print statements, but automatically puts the text double-height on a Mode 7 screen.

The code is assembled at &B00 and only occupies one page of memory. To run it CALL &B00 when the code is *LOADed or simply *RUN $.double. To turn it off, CALL &B0B.

In both cases however, you must have the window set up as shown in PROCwindow.

The routine works by intercepting the *oswrch* vector and then prints the character twice – one above the other – which produces a double height letter when combined with the double height letter teletext codes that are automatically inserted.

There are some problems that the routine does not overcome: Cursor editing is not intercepted and when used on longer lines may cause the teletext chip to display the wrong half for each double height character. To prevent this the *FX4,1 command could be used.

Also, having a text window containing an odd number of rows or defining a new text window within an old one may cause the same effect. However in a properly written program these problems do not occur.

```
 10 REM Double Height Text
 20 REM by Rob Payne
 30 byte=&FFF4
 40 vec=?&20E+256*?&20F
 50 FOR pass=0 TO 2 STEP 2
 60 P%=&B00:[OPT pass
 70 .dbl_on
 80  LDA #dbl MOD 256:STA &20E
 90  LDA #dbl DIV 256:STA &20F
100  RTS
110 .dbl_off
120  LDA #vec MOD 256:STA &20E
130  LDA #vec DIV 256:STA &20F
140  RTS
150 .dbl
160  STA acc:STX x_reg:STY y_reg
170  LDA vdu31:BNE move2
180  LDA #&DA:LDX #0:LDY #&FF
190  JSR byte:CPX #0:BNE norm
200  LDA acc:CMP #11:BEQ up_down
210  CMP #10:BEQ up_down
220  CMP #12:BEQ clear
230  CMP #31:BEQ move
240  CMP #30:BEQ home
250  CMP #32:BCC norm
260  CMP #127:BEQ delete
270  LDA acc:JSR vec
280  LDA #11:JSR vec
290  LDA #8:JSR vec
300  LDA acc:JSR vec
310  LDA #10:JSR vec
320  LDA #&86:JSR byte
330  CPX #0:BNE end
340  LDA #10:JSR vec:JMP end
350 .norm
360  LDA acc:JSR vec:JMP end
370 .up_down:LDA acc:JSR vec
380  JSR vec:JMP end
390 .move LDA #2
400  STA vdu31:JMP norm
410 .move2 DEC vdu31:BNE norm
420  LDA acc:CLC:ROL A:CLC:ADC#1
430  JSR vec:JMP end
440 .clear LDA #12:JSR vec
450  LDA #10:JSR vec:JMP end
460 .home LDA #30:JSR vec
470  LDA #10:JSR vec:JMP end
480 .delete LDA #&86:JSR byte
490  CPX #0:BNE del2:LDA #11
500  JSR vec:.del2:LDA #127
510  JSR vec:LDA #9:JSR vec
520  LDA #11:JSR vec:LDA #127
530  JSR vec:LDA #10:JSR vec
540 .end LDA acc:LDX x_reg
550  LDY y_reg:RTS
560 .vdu31 BRK:.acc BRK
570 .x_reg BRK:.y_reg BRK
580 ]:NEXT:PROCwindow:CALL dbl_on
590 *SAVE $.double B00 BFF
600 PRINT"Turn on:  CALL &B00"
610 PRINT"Turn off: CALL &B0B"
620 END
640 DEF PROCwindow:VDU26
650 FOR A%=0 TO 24
660 VDU31,0,A%,141:NEXT
670 VDU 28,1,23,39,0,12
680 ENDPROC
```

Get it right!

```
 10 =    0 0 240 =  C47 F 470 = D124 D
 20 =    0 0 250 = 57F0 2 480 = 56CA 3
 30 = 1A0D D 260 = 41A3 3 490 = BCB2 5
 40 = 2763 6 270 = CB93 0 500 = 6618 9
 50 = B43B 0 280 = DDB3 2 510 = 4D0B F
 60 = 5E69 D 290 = A047 F 520 = 2219 3
 70 = AAFB A 300 = CB93 7 530 = 3956 9
 80 = CAC9 A 310 = 3690 8 540 = A690 2
 90 =  C68 0 320 = 1A1C 0 550 = F7A2 6
100 = 9843 E 330 = 3C8B D 560 = B6EB E
110 = 6A69 C 340 = D124 8 570 = D15D 6
120 = C3C1 E 350 = 58FE 8 580 = A086 E
130 =  560 0 360 = 124F 7 590 = D062 9
140 = 9843 F 370 = 5F94 6 600 = E762 E
150 = 12DD 4 380 = 15AD 3 610 =  AB3 1
160 = F95E E 390 = DECB A 620 = FD2E 9
170 = 668F 5 400 = FF12 D 640 = CBE5 3
180 = 1FB9 D 410 = B797 6 650 = D295 C
190 = 8641 7 420 = BA32 E 660 = DE0D A
200 = 5A34 D 430 = 15AD B 670 = 5394 1
210 = 802B 3 440 = 3428 1 680 = ED0F D
220 = 6C46 7 450 = D124 B
230 =   CE 9 460 = 85FD 6
```

Title: Elegant Text Printer
Language: 6502
Author: Andrew Moulden

This routine could be considered third in the series evolving from Petra Galloway's two print routines (Library, March and July 1987). It is an improvement because the string can contain any characters and no data tables are required.

To include the routine just add lines 1000 to 1190 to the end of your programs and include:

```
OPT FNassemblep
```

at the end of your assembly code, and wherever you want to output some text just use:

```
OPT FNprint("Text")
```

This causes the following code to be assembled:

```
JSR print
EQUB 4 \length of text
EQUS "Text"
```

The print routine reads the number of characters in the text string and then prints them out, returning control to the main routine after the last string character.

The A, X and Y registers are preserved and all the labels within *print* are suffixed with the underline character to prevent any clashes with label names in the rest of the program.

If you have a string that is used more than once then place the call in a subroutine like this:

```
.not_imp
OPT FNprint("Not written
yet")
RTS
```

This can be printed using a *JSR not–imp* whenever it is needed.

```
   10 REM Elegant Text-Printer
   20 REM by Andrew Moulden
   30 DIM code 256
   40 FOR L%=0 TO 2 STEP 2
   50 P%=code:[OPT L%
   60 .test
   70  OPT FNprint("It works!"+CHR$
 13)
   80  RTS
   90  OPT FNassemblep
  100 ]:NEXT
  110 CALL test:END
 1000 DEF FNprint(a_$)
 1010 [OPT L%:JSR print_:]
 1020 ?P%=LEN(a_$):P%=P%+1
 1030 $P%=a_$:P%=P%+LEN(a_$):=L%
 1040 DEF FNassemblep
 1050 ptr_=&F8:[OPT L%:.print_
 1060  STA astore_:PLA:STA ptr_
 1070  PLA:STA ptr_+1
 1080  TXA:PHA:TYA:PHA
 1090  LDY #1:LDA (ptr_),Y
 1100  STA len_:INC len_
 1110 .ploop_ INY
 1120  LDA (ptr_),Y:JSR &FFE3
 1130  CPY len_:BNE ploop_
 1140  LDA ptr_:ADC len_:STA ptr_
 1150  LDA ptr_+1:ADC #0:STA ptr_+1
 1160  PLA:TAY:PLA:TAX:LDA astore_
 1170  JMP (ptr_)
 1180 .len_ BRK:.astore_ BRK
 1190 ]:=L%
```

Get it right!

```
 10 =    0 0 1000 = 222D 8 1110 = 6207 B
 20 =    0 0 1010 = 3BDC 1 1120 = DFCD 4
 30 = B3C2 2 1020 = EAFE D 1130 = DF41 2
 40 = AAB9 A 1030 = AAB6 0 1140 = A5EA 6
 50 = 7CBB B 1040 = 4C15 7 1150 = 3516 D
 60 = 5C1A 1 1050 = C538 B 1160 = 49A6 5
 70 = 3D57 B 1060 = F892 6 1170 = F249 3
 80 = 9843 F 1070 = 72CE 1 1180 = 953E 0
 90 =  2DF B 1080 = 86E2 5 1190 = CB98 5
100 = DA42 F 1090 = EF95 B
110 = 6B7F 7 1100 = BA28 7
```

Title: Teletext characters
Language: Basic
Author: Teri Paul

When you're working on a Mode 7 screen it is fiddly trying to work out what characters produce which graphics patterns.

This simple program produces a blank template of the 3x2 graphics block character and allows you to alter the arrangement to produce the character you want by pressing one of the six keys indicated. At the same time it prints the Ascii value of the display.

```
  10 REM Teletext Characters
  20 REM by Teri Paul
  30 MODE4:VDU23;8202;0;0;0;
  40 q=160:sx=2:sy=3:ix=200:iy=200
  50 bs=160:bb=16:ox=200:oy=200
  60 DIMa(sx,sy),k(sx,sy),n$(sx,sy)
  70 FOR X=1 TO sx:FOR Y=1 TO sy
  80 READ a(X,Y),n$(X,Y):NEXT:NEXT
  90 FOR X=1 TO sx:FOR Y=1 TO sy
 100 PROCbox(X,Y,k(X,Y)):NEXT:NEXT
 110 REPEATREPEATG$=CHR$(GETAND&5F)
 120 G%=INSTR("ZXASQW",G$):UNTILG%
 130 y=(G%+1)DIV2:x=2-G%MOD2
 140 k(x,y)=NOTk(x,y)
 150 PROCbox(x,y,k(x,y))
 160 z=a(x,y):IF NOTk(x,y) z=-z
 170 q=q+z:PRINTTAB(0,0)q"q,SPC5;
 180 IF q=255 VDU32 ELSE VDUq-128
 190 UNTIL0
 200 DEF PROCbox(X,Y,F%)
 210 LOCAL x,y:x=(X-1)*ix+ox
 220 y=(Y-1)*iy+oy:PROCb(x,y,bs,1)
 230 PROCb(x+bb,y+bb,bs-2*bb,F%)
 240 MOVE x+(bs-bb)/2,y+(bs+bb)/2
 250 GCOL3,1:VDU5,ASCn$(X,Y),4
 260 ENDPROC
 270 DEF PROCb(x,y,z,C%)
 280 GCOL 0,C%:MOVE x,y
 290 DRAW x+z,y:PLOT 85,x,y+z
 300 PLOT 85,x+z,y+z:ENDPROC
 310 DATA 16,Z,4,A,1,Q
 320 DATA 64,X,8,S,2,W
```

Get it right!

```
 10 =    0 0  120 = 1F49 D  230 = F81E 8
 20 =    0 0  130 = 8E37 2  240 = C36A 0
 30 = BA2D D  140 = 8DEA 4  250 = 20DC E
 40 = 99B6 2  150 = 451A A  260 = ED0F 8
 50 = CCCB A  160 = CFA7 2  270 = BD1C F
 60 = BB74 5  170 = A68A F  280 = DDFD 7
 70 = 3048 9  180 = ED60 0  290 = A3A7 1
 80 = 5E68 A  190 = 53CE 6  300 =  2E7 E
 90 = 3048 C  200 =  790 7  310 = 1C9A 1
100 = 4FF2 F  210 = AED4 0  320 = 5921 5
110 = 5B8B 1  220 = 8036 D
```

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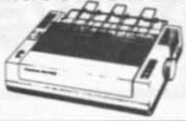

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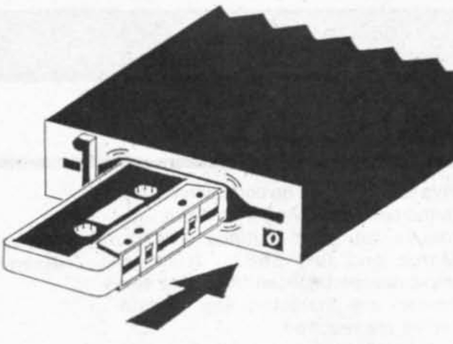

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PROGRAM Library

Title: Fax Diary
Language: Basic
Author: Richard Gregg

A personal organiser is very useful but pricey. We can't do anything about the cost of the binder, but stationery is another matter. This program prints page planners for complete months in a suitable fax style, and if you have the proper continuous stationery it will look even better – otherwise you'll have to cut the printed sheet to size.

When run, the program prompts you to enter first the year then which day of the week it starts on – press space to circle through the options and return to select.

You can then set up the printer paper and the program will print the whole year.

There is a pause between each page to allow you to adjust page lengths and so on. Although the program could be made more automatic it works fine as it stands and it is very simple to use.

```
   10 REM Fax Diary
   20 REM by Richard Gregg
   30 MODE7:DIM day$(42),month$(12)
 ,nday(12)
   40 INPUT"Enter year :"Y%
   50 FOR M%=1 TO 42
   60 IF (M%-1)MOD7=0 THEN RESTORE
   70 READ day$(M%):NEXT
   80 PRINT"What day does ";Y%" sta
 rt on?""(Space then Return)"
   90 X%=POS+4:Y%=VPOS+1:D%=0
  100 REPEAT D%=D%+1:IF D%=8 D%=1
  110 PRINTTAB(X%,Y%)day$(D%);
  120 REPEAT A%=GET
  130 UNTIL A%=32 OR A%=13
  140 UNTIL A%=13:FOR M%=1 TO 12
  150 READ month$(M%),nday(M%):NEXT
  160 IF Y%MOD4=0 nday(2)=29
  170 PRINT"Ready printer!"
  180 REPEAT UNTIL GET=32
  190 VDU 2,1,27,1,15
  200 VDU 1,27,1,71,1,27,1,45,1,1
  210 FORM%=1TO12:L%=LENmonth$(M%)
  220 PRINT'SPC6month$(M%)SPC1;
  230 PRINT;Y%SPC(42-L%)
  240 E%=D%+nday(M%)-1:Q%=46
  250 FOR V%=D% TO E%
  260 IF V%-D%+1>9 Q%=45
  270 PRINTday$(V%)SPC1"|"SPC1;
  280 PRINT;V%-D%+1SPCQ%:NEXT
  290 D%=(nday(M%)+D%)MOD7
  300 IF D%=0 D%=7
  310 IF M%<12 VDU3,7:PRINT"Next pa
ge!":REPEATUNTILGET=32:VDU2
  320 NEXT:VDU3:END
  330 DATA Mon,Tue,Wed,Thu
  340 DATA Fri,Sat,Sun
  350 DATAJanuary,31,February,28
  360 DATAMarch,31,April,30,May,31
  370 DATAJune,30,July,31,August,31
  380 DATASeptember,30,October,31
  390 DATANovember,3fl,December,31
```

Get it right!

```
 10 =    0 0  140 = B008 4  270 = 8913 7
 20 =    0 0  150 = BED9 0  280 = 4D0A 1
 30 = 1767 7  160 = 7532 7  290 = 2662 9
 40 = 8A82 E  170 = F45D 9  300 = EFCC 6
 50 = E845 7  180 = 2B9E 4  310 = 2241 6
 60 = EE54 D  190 = 3D07 2  320 = 54BA E
 70 = 6F3C 3  200 =  AA6 8  330 = 1B70 2
 80 = AB82 5  210 = 738A 8  340 = C494 6
 90 = 7A43 6  220 = CD86 4  350 = 30D2 B
100 = A7BE 5  230 =  92A A  360 = 6D35 F
110 = 9FB9 7  240 = ADAF B  370 = 9DA8 7
120 = 3991 2  250 = F5A2 E  380 = 55D7 3
130 =  408 8  260 = E25C F  390 = EE71 C
```

Title: String Search
Language: Basic (any)
Author: Peter Cumberland

Apart from string sorts – see Alpha Sort in our March 1988 issue – a common requirement when handling strings is a search facility.

The two routines below, when combined, allow you to examine a list of strings searching for those which contain a particular string within them.

The function *cap* is used to convert both the search string and the one being checked into upper case. And *FNinstr* performs the actual search – it is important to ensure that the string being searched for is longer than the other to avoid the known bug in Basic I which otherwise causes a crash.

Both routines are quick, compact and easily incorporated into your own programs.

```
   10 REM String Search
   20 REM by Peter Cumberland
   30 MODE7:DIM p%256
   40 REPEAT CLS:RESTORE:count=0
   50 PRINT"Enter search string";
   60 REPEAT INPUTitm$:UNTILitm$>""
   70 itm$=FNcap(itm$):PRINT
   80 REPEAT READ wrd$:wrd$=FNcap(wr
 d$)
   90 IF FNinstr(wrd$,itm$)>0 PRINT
 wrd$:count=count+1
  100 UNTIL wrd$=""
  110 IF count=0 PRINT"Not present"
  ELSE PRINT"Total = ";count
  120 PRINT"Another? ";
  130 REPEAT x$=CHR$(GETAND&DF)
  140 UNTIL FNinstr("YyNn",x$)
  150 PRINTx$:UNTIL x$="N":END
  160 DEF FNcap($p%)
  170 LOCAL A%,B%,L%,Z%
  180 A%=ASC"a":Z%=ASC"z"
  190 FOR L%=0 TO LEN$p%-1:B%=p%?L%
  200 IF B%>=A% IF B%<=Z% p%?L%=B%AN
D&5F
  210 NEXT:=$p%
  220 DEF FNinstr(w$,i$):LOCAL P%
  230 IFLENw$>=LENi$P%=INSTR(w$,i$)
  240 =P%
  250 DATA Put,your,characters,in,a
  260 DATA list,here,(anything,will,
do)
  270 DATA and,place,a,null,string
  280 DATA at,the,end,of,it,""
```

Get it right!

```
 10 =    0 0  110 = 64F0 3  210 = BCCC 6
 20 =    0 0  120 = 1E0B 9  220 = E955 1
 30 = 11FD D  130 = 8ED7 5  230 = 92F0 3
 40 = 8644 B  140 = 9391 7  240 = FD8C 8
 50 = FCD1 4  150 = A3BC 0  250 = F967 7
 60 = 1BB3 A  160 = 6632 3  260 = CE4F B
 70 = A95A 4  170 = 7FB9 C  270 = D359 B
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 90 = B7D0 1  190 = 7943 1
100 = ECFE 8  200 = B4AA E
```

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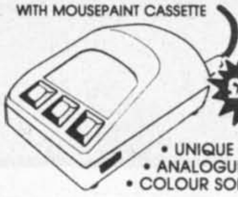

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Harvey Coleman – can he cut the mustard for Acorn?

Harvey Coleman was recently appointed to the hot seat behind the managing director's desk at Acorn. The Micro User news editor Mike Cowley dropped in on him to establish why he's likely to make a significant contribution to the company.

THE trouble with most bosses of computer firms is that they are either boffins or marketing men, but rarely both. Sir Clive Sinclair, for one, couldn't go wrong when it came to making technological waves, but then almost drowned in the quicksand he created with the C5.

Amstrad's Alan Sugar is undoubtedly a super salesman. In fact, he might even have been able to flog the three-wheeler that ranks alongside the Ford Edsel as one of world's greatest man-made disasters. But he will never be remembered as an innovator. Just imagine how much more money he could have made if he knew the difference between rom and ram?

Harvey Coleman, Acorn's new managing director, however, is one technocrat who appears to be in tune with the end user. And that's why he was picked by Olivetti to achieve the as yet to be realised true potential of Acorn.

Harvey Coleman: Acorn's new managing director

"Some people have taken the view that maybe I came along to do what Olivetti would 'require' of me", he said, "but that isn't the situation. I have no opportunity to go back and blame somebody for giving me the wrong set of directions. Those are decisions we'll have to take here and be accountable for".

His mission, as defined by his bosses in Italy, is twofold: To develop machines that are not only successful in the home market but also then can be sold back to Olivetti whose marketing muscle will help establish a global presence.

"Olivetti's position is like that of the British Government in that it is not going to nurse lame ducks", says the latest Mr. Acorn. "It looks forward to having a strong company which can sell because of the quality of the product".

To understand what makes Harvey Coleman tick, it is necessary to examine his career to date. For it is the sum total of his experience which will influence the course he will now chart for Acorn. Born in Hampstead, London, he attended Kilburn Grammar School before going on to take a degree in physics at St. Peter's College, Oxford.

As a brilliant mathematician, he opted for physics after being told there was no future in the numbers game unless he wanted to teach. Once he'd graduated, he went into industry and initially ended up developing non-round moulded plastic containers.

His first brush with computers came in 1964 when he found himself working with drum-based machines. For Harvey Coleman this proved to be a milestone in his career. He found programming fascinating, and eventually moved to a software house, working on early online systems.

One project saw him design a system to compute British Rail timetables. To achieve this, he created a working model of the thinking processes of the timetabler. "It actually looked at such considerations as to how long it takes a 60-year-old to cross from platform one to platform six at Crewe in order to make a connection", he recalls. Because of his online expertise, he was eventually sought out to design a system for commercial data processing – the first of its kind in the world.

Turn to Page 78 ►

> *Here's one technocrat who appears to be in tune with the end user*

◄ *From Page 77*

It called for intelligent terminals which had to be developed, because at that time they didn't exist.

"We actually started to sell that system, but unfortunately the company failed", says Harvey Coleman. "And it failed because it got its marketing wrong. I vowed at that time that I would never again be involved with excellent technology which did not have strong marketing behind it".

To make certain he would have some control over this, he switched careers in mid-stream, moving from the backroom to the sharp end in sales. In the late 70s he was hired by British Olivetti as marketing manager, subsequently becoming sales manager. Working primarily in the finance sector, he sold the first system to the Abbey National Building Society and then Barclays Bank.

"I think it gives a view of my feeling about the end user in that I encouraged the people at Barclays not only to take on a piece of hardware but also to actually involve designers from Olivetti in the shape of the furniture on which the equipment was to sit", he remembers. "They were very happy with the fact that someone had taken the trouble to worry about the user".

Olivetti, recognising Coleman as a high flyer, soon installed him at headquarters to head up two groups, one dealing with support to worldwide activities in the banking world, the other to take some responsibility for office information. It was in these dual roles that he gained considerable knowledge of world markets, further enhancing his reputation within the close knit Olivetti fraternity.

> *We have the most advanced technology of its time at our fingertips*

IN his last days at Olivetti he found himself in charge of vertical market strategy, with a series of "watchers" world-wide reporting back to him. "With Acorn having Olivetti as its major shareholder one of the benefits will be the ability to pick up the phone and get this vital market information", he says.

Harvey Coleman admits to having taken a long hard look at the Acorn situation before agreeing to becoming managing director.

What then did he find wrong at the company? "Too broad a base of enthusiasm", he insists. "Tremendous enthusiasm in fact, but not focussed enough and focus is very important. However, I didn't find anything I consider to be drastic."

Does his arrival mean there will be further major staff upheavals as were witnessed last year? "I would hope not", he says. "I have been given an opportunity to work from a base from which we can expand.

"That doesn't mean to say there won't be a few odd people who have to go, but you will see there is already recruitment going on to fill in gaps to ensure all areas are correctly staffed.

"But everything we do from now will have to be profitable. We won't be undertaking projects just because two or three people think it's a good idea.

"I cannot afford to run elements of this company at a loss".

Harvey Coleman believes that his trump card at Acorn is that it has achieved the jump from 8 bit technology to 32 bit in the form of the Archimedes. "The fact of the matter is that what this has given me as a marketeer, not just as MD, is technology which has some longevity", he points out. "We know that we are not getting to market with products that are already out of date. That is a very important advantage to us – and one we must capitalise on".

FROM his first day in the job the new Acorn boss has made no secret of the fact that he intends to consolidate the company's educational base before striking out in new directions. Firstly into small business, then into carefully targeted vertical markets.

"I want the educationalists to understand our total commitment to them, however", he says, "and the very fact that we intend to broaden our base should give them a degree of confidence in the future.

"That confidence is already being reflected by the news that South Tyneside is going to take the Archimedes as its basic machine because it believes we can deliver the applications. And don't forget – and it's most important – we are not dropping the Master series.

"That's a highly competitive product in its own right in that it offers not only an immense library of applications but also reliability.

"Utilisation of these machines is so high that when they are held centrally by some education authorities, there is a two weeks waiting list to use them. In fact, Acorn's product reliability is so good that it can be seen as a disadvantage in some ways. To appreciate this, all you have to do is look at all the BBC Micros that are still being used every day out there".

Though convinced that Acorn has got the products, Harvey Coleman intends to breathe fresh life into the company's marketing arm. "I hope we are going to be better in that we are going to be more complete", he says. "We are going to have to think through the totality of the offer to our customers, in terms of everything from the point in time when we announce to when they actually get to use it as customers.

"My objective in marketing has always been to have happy customers, happy in what they've got in terms of value for money and ease of use.

"We happen to have something that has the potential to meet those requirements. We have the most advanced technology of its time at our fingertips. However, it's no use being first in the market with something unless we know what to do with it. And it will take a little while. I'm not going to guarantee that we'll do everything right first time".

It seems, however, that Harvey Coleman has immediately done something right first time. Any day now he'll be reporting a major sale to his old pals at Olivetti. "I hope to be able to announce a significant first order shortly. And I foresee the opportunity to sell more and more of our technology – and not just to Olivetti.

"Watch this space", says Harvey Coleman, technocrat and marketeer.

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Viewing in style

John Allen shows how to create Basic effects with the Z88 VDU codes

THE Z88 uses BBC Basic so it doesn't take long to become familiar with the language in new surroundings. But what can be done on the portable computer that can't be done on the BBC Micro? The Z88 manual gives few hints, and I am now going to look at two types of facilities provided by the Z88 VDU drivers: Windows and what are called hardware attributes – effects that can be applied to the display, like bold lettering.

The short demonstration program below – which will only run on the Z88 – illustrates some of these facilities. Many of the Z88's VDU codes toggle effects – the same code turns them on and off and you can see this by typing any effect's name twice. Also most of them are cumulative, so BOLD followed by FLASH will produce bold flashing text.

So how does it work? Codes are sent to the VDU drivers either using the VDU command – where the parameters are one byte integers – or PRINT – where the parameters are Ascii characters. The demonstration illustrates both methods. All the codes explained here are VDU1 codes – they start with a 1 being sent to the drivers to signify that an effect is wanted.

Let's look at the demonstration program – line 60 is a good starting point. It sets up the left-

Turn to Page 82 ▶

USEFUL WINDOW CODES

Here are the most useful codes if you are using windows. The parameters must be entered as Ascii codes unless they are bracketed: (1) should be sent as VDU1 or PRINT CHR$(1) while C would be sent as VDUASC("C") or PRINT "C".

To set up a window use:

```
(1),7,#,window number,(32+topx),(32+
topy),(32+width),(32+depth),(type)
```

The type can be one of the values:

128	no lines
129	vertical bars
130	shelf brackets at top for a banner
131	bars and brackets

Once a window is defined you can use the following:

Select	(1),2,H,window number
Select and clear	(1),2,C,window number
Select and clear if first selection	(1),2,I,window number
Position cursor at (x,y)	(1),3,@,(32+x),(32+y)
Position cursor at column x	(1),2,X,(32+x)
Position cursor at row y	(1),2,Y,(32+y)
Grey window	(1),2,G,+
Ungrey window:	(1),2,G,-

```
   10 REM Z88 VDU Drivers Demonstration
   20 REM by John Allen
   30 REM (C) The Micro User
   40 CLS
   50 A$=CHR$(1)
   60 VDU1,ASC("7"),ASC("#"),ASC("1"),32
,32,64,40,129
   70 VDU1,ASC("7"),ASC("#"),ASC("2"),74
,34,54,38,131
   80 PROCtext("NO")
   90 PRINT A$;"2C1";"Please enter choic
e of effect."'"Options are: BOLD, FLASH,
'"GREYTEXT, INVERSE, TINY,"'"UNDERLINE,
 GREY and UNGREY."'
  100 INPUT "Choice: " action$
  110 IF action$ = "GREY"   PRINT A$;"2H
2";A$;"2G+";A$;"2H1";:GOTO 90
  120 IF action$ = "UNGREY" PRINT A$;"2H
2";A$;"2G-";A$;"2H1";:GOTO 90
  130 IF action$ = "END" PRINT A$;"2C8";
A$;"C";A$;"S":END
  140 PROCtext(action$)
  150 GOTO 90
  160 REM
  170 DEFPROCtext(a$)
  180 PRINT A$;"2I2";
  190 IF a$ = "NO" PRINT A$;"R";SPC(4);"
EFFECT WINDOW";SPC(5);A$;"R";
  200 VDU1,ASC("3"),ASC("@"),32,33
  210 IF a$ = "BOLD"      VDU1,ASC("B")
  220 IF a$ = "FLASH"     VDU1,ASC("F")
  230 IF a$ = "GREYTEXT"  VDU1,ASC("G")
  240 IF a$ = "INVERSE"   VDU1,ASC("R")
  250 IF a$ = "TINY"      VDU1,ASC("T")
  260 IF a$ = "UNDERLINE" VDU1,ASC("U")
  270 PRINT"This is demonstration"'"tex
t in the effect"'"window.";A$;"2C1";
  280 ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 159.

◄ From Page 81

hand window using the following parameters: 1 signifies an effect, 7 is the number of parameters (sent in Ascii), and # (in Ascii) is the code to set up a window with 1 as its number.

The remaining numbers give the placing and size of the window in the form top-left corner x coordinate, top-left corner y coordinate, width and depth – in practice 32 has to be added to each parameter. The display is 94 characters by 8 and the origin is at the top left, so this window starts at 0,0 (32,32) and has a width of 32 (64-32) and a depth of 8 (40-32). The final parameter specifies the type of border for the window.

The Z88 has five windows available to programmers and the right hand window, numbered 2, is set up by line 70. Windows 6,7 and 8 are used by the system with 8 being the default Basic window. It's a good idea to return to this window – as shown in line 130 – when you exit a program. The default when you open a window is cursor off, so this line also switches it back on to leave the Z88 with the usual Basic screen defaults.

Line 90 uses PRINT to tell the Z88 that output should be to window 1. In turn the parameters are *A$* – the equivalent to VDU1 – 2 is the number of parameters to follow, C selects a window and 1 gives the window number. Windows can also be selected using H or I, as can be seen in line 180.

Line 200 moves the cursor to position 0,1 in the currently selected window – in this case 2. Again 32 has to be added to all coordinates.

The demonstration hardware effects are selected by lines 210 to 260. These only apply to any text output after they have been selected and not to the whole window. But it is possible to make a whole window grey, even when it already has text in it. This is shown in line 110 and reversed in line 120.

So there you have it. A demonstration routine showing some of the effects you can incorporate in your own programs on the Z88.

HARDWARE ATTRIBUTES

All the following can be toggled on and off:

Bold text	(1),B
Cursor	(1),C
Flashing text	(1),F
Grey text	(1),G
Upper case lock	(1),L
Reverse text	(1),R
Vertical scrolling	(1),S
Tiny text	(1),T
Underlined text	(1),U
Horizontal scrolling	(1),W

When vertical scrolling is enabled text will roll off the top of the display as new text is written at the bottom. Setting horizontal scrolling on will stop lines wrapping round on the next line.

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Portable fantasy

Pam Turnbull gives the Z88's first text adventure a trial run

Product: Withered Toad
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Tel: 0296 437878

I SUPPOSE that it was only a matter of time until someone introduced games to the Z88. Indeed in some ways it's the ideal medium – portable, battery-powered and compact. Unfortunately, the screen does limit the type of game but is ideally suited to text adventures. Now the addict can play whenever he or she wants and flip to the game from any of the Z88's other facilities.

Full marks then must go to Wordmongers for Withered Toad. This text adventure is expensive – but the main cost is that of the eprom, with the game itself adding only £5 on top. In time the price of the hardware will probably come down.

A daunting licence agreement comes with the package, as with all Wordmongers' products, to remind you of copyright restrictions – but it's rather unusual for games.

Setting up is easy – just a matter of plugging the eprom into your Z88 and from then it appears as an option on the Index and is as simple to load as Pipedream. Do take note of the fitting instructions on the inlay – don't remove a ram cartridge to insert the game.

Where I was most disappointed was in the quality of the parser. Over the last few years we have seen an increase in the quality of adventure parsers thanks to Quill and other adventure creators. Unfortunately, for this game any avid adventurer must return to the days of precise statement – no more TAKE ALL commands. As far as directions are concerned you are limited to the four major compass points, anything more complicated is met by incomprehension.

The knack is to use succinct, simple commands, limited to two words. Abbreviations are allowed, but the vocabulary is limited and more than ever you need to be on the same wavelength as the authors

Now to the game itself. You and the withered toad must find your way home via the tube station. You start alone in your room with a locked door and a key. Mysteriously – and via a 007-type lift – you find yourself in a basement apartment reminiscent of poorer student days – full of discarded food and green slime!

The withered toad himself pops in and out of the adventure signalled by a bleep from your micro and the description of the little creature hopping on and off your head. But there is no simple way of following the toad through the passages.

The Withered Toad is not a large adventure – it has about 40 locations. I enjoyed playing it though, and I am sure the teeth marks and footsteps must belong to someone but I haven't found out who yet and I am not sure I want to – especially as each time I wanted to hit something with my sword I was told that this was a nice game and I couldn't do that.

A couple of friends who played the game were disappointed by the size – but they play more adventures than me and this game is not aimed at them. Not having much time to spare I appreciate the ability it gave me to pop out of the game into Pipedream whenever I needed, knowing that I could rush back to avert doom a little later. I especially like not having to save and load first – you can save your position to be on the safe side, though.

Wordmongers was not attempting to write a definitive Colossal Cave type of adventure but an enjoyable and entertaining game. Once you have succeeded you are invited to send in your comments so that these ideas can be incorporated into the next one.

Wordmongers has already supplied a Defender type game on one eprom and seems to be ready to introduce more than just comms packages to the Z88 – indeed it has plans for a database manager, a filofax-type facility and a machine code assembler.

No one is trying to say that the Z88 is a portable games machine, and it would be to trivialise many of its uses and facilities to do that. Yet Withered Toad does open up another use and offers light relief, which is always welcome. It is wittily written and, despite the cost, I look forward to seeing Wordmongers' next offering.

Points for:

- **Ideal introduction to adventures**
- **Always ready to play**

...against:

- **Poor parser**
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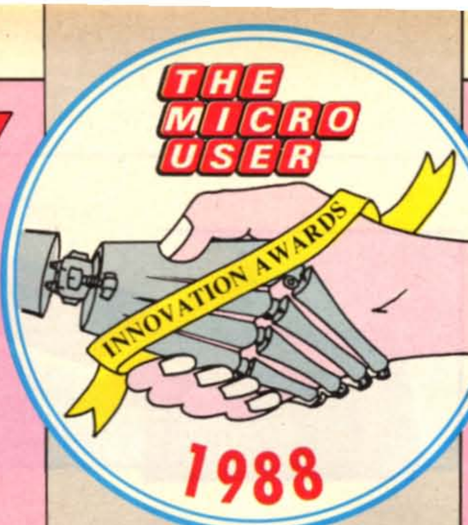

Last year's Innovation Award was an outstanding success with more than 500 users of the BBC Micro competing for the prestigious accolade.

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Tell us what your BBC Micro or Acorn Archimedes is doing that is out of the ordinary. It may be a project with exciting commercial potential, with significant social benefit – or even just for fun. Whether you're an individual, group, school or business, this contest is open to you – there's no restriction.

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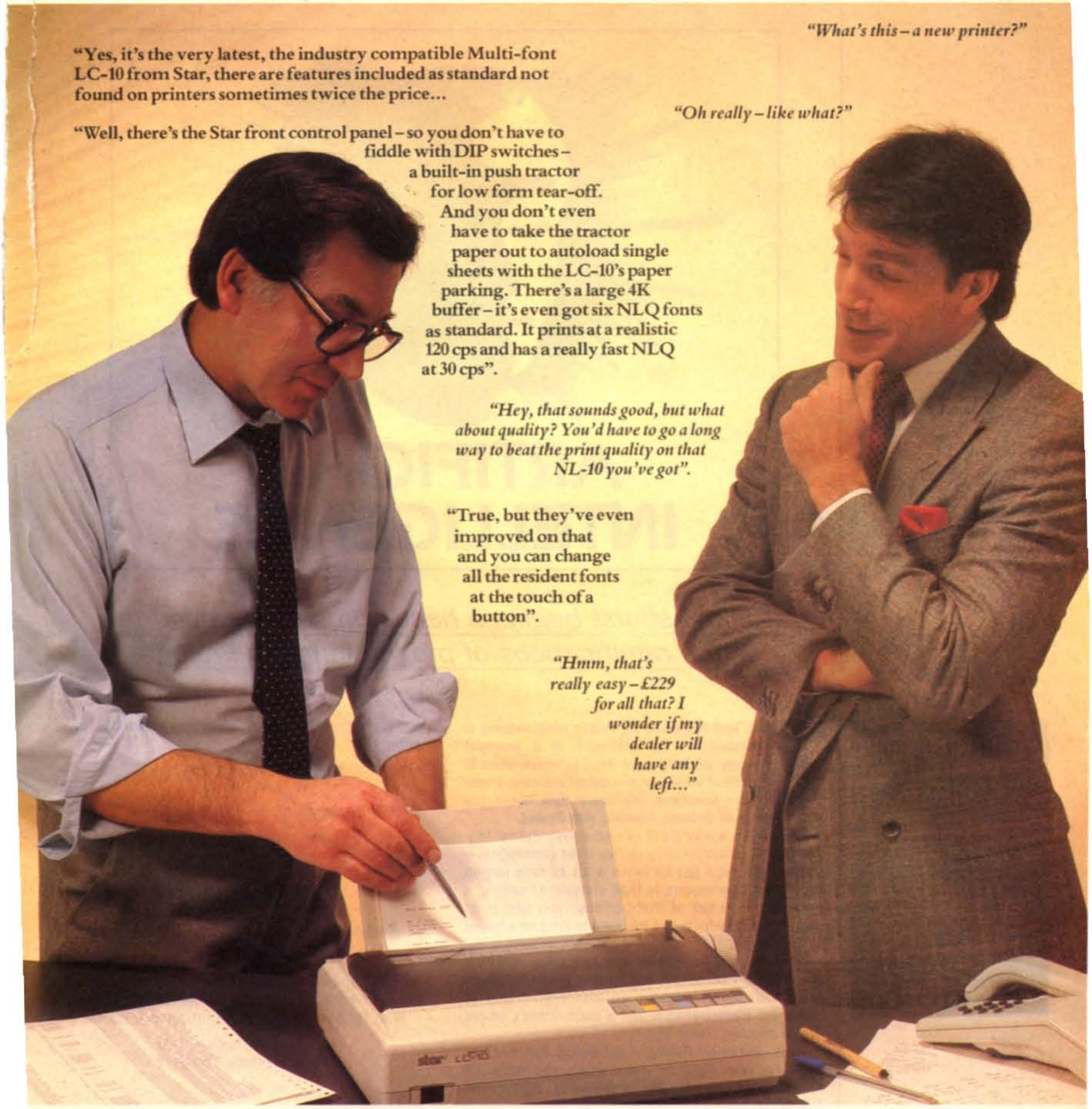

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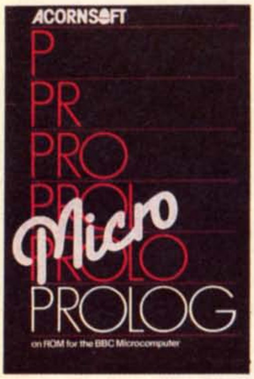
ARTIFICIAL INTELLIGENCE

John Ashurst begins a hands-on series exploring the ramifications of programming in Prolog



THE best reason to try Prolog programming is because it's fun and easy. It is foremost among the languages used by researchers in artificial intelligence – expert systems, translation machines, intelligent data bases and smart robots all become possible with Prolog.

It works in a way quite unlike conventional languages: It is declarative rather than procedural – that's right, you get to learn a lot of new jargon too. What this means is that instead of seeing a program as a set of instructions, you see it as items of data which can be used to find an answer to a problem.

An excellent version of the language is available for the BBC Micro, but for some extraordinary reason it comes without an elementary text to allow the beginner to make a start. That's where these articles come in.

First, initialise Prolog – following the instructions for your version – and when you have the microProlog prompt, the ampersand, type in the following:

```
((father joseph jesus))
```

This asserts to Prolog that *joseph* is the father of *jesus*. The first word – *father* – is known as the relation name. Typing:

```
LIST father
```

or

```
LIST ALL
```

will show that this has been stored correctly. Now enter:

```
?((father joseph X)(PP Joseph
 is the father of X))
```

PP just means print, so you should see:

```
Joseph is the father of jesus
```

while:

```
?((father X jesus)(PP Jesus is
 the child of X))
```

would give:

```
Jesus is the child of joseph
```

So you can see that any of the terms of our single piece of information can be retrieved quite easily.

Now let's try something a little more subtle:

```
((parent X Y)(father X Y))
?((parent joseph jesus)(PP
 Yes))
```

will output:

```
Yes
```

while:

```
?((parent joseph fred)(PP
 Yes))
```

Will output a ? which may be considered as a *don't know* response.

The interesting thing about this is that the micro apparently knows that *joseph* is the *parent* of *jesus* even though we have never explicitly said so. All that Prolog knows is:

```
((father joseph jesus))
```

which is a fact, and:

```
((parent X Y)
 (father X Y))
```

which is a rule stating that if *X* is the *father* of *Y* then *X* is a *parent* of *Y*. A similar rule would be:

```
((parent X Y)
 (mother X Y))
```

One way of looking at the way Prolog works – there are several ways, each one helpful in its place – is that it tests each clause it meets to see if it is true.

```
((mother mary jesus))
```

is true because we assert it. There are no variables, so there is no way it cannot be true. However:

```
(parent X Y)
```

is only true in Prolog terms, if there is a:

```
(father X Y)
```

or

```
(mother X Y)
```

that is true.

Consider this query:

```
?((parent mary X)(PP Mary
 parent of X))
```

Prolog will first examine the clauses relating *parent* and *father*, but it will fail to find a match because *mary* is not the *father* of anyone. But – unlike other languages – it will not give up but go on to examine the next *parent* clause where it succeeds: It will return from the *mother* clause with *jesus* assigned to the variable *X*.

Here is a clause for *daughter*:

```
((daughter X Y)
 (parent Y X)
 (female X))
```

This could be expanded to say:

```
IT IS TRUE THAT X IS THE
  daughter OF Y
 IF IT IS TRUE THAT Y IS
   A parent OF X
AND
 IF IT IS TRUE THAT X IS
   female
```

Prolog clauses can have any number of additional lines – called atoms – which may all be supposed to be connected by AND IF as above.

Here are a few more clauses:

```
((grandfather X Y)
 (father X Z)
 (parent Z Y))

((sister X Y)
 (parent Z X)
 (parent Z Y)
 (female X))
```

This one would not prevent a girl from being her own sister, so it must be modified to:

```
((sister X Y)
 (parent Z X)
 (parent Z Y)
 (NOT EQ X Y)
 (female X))
```

You will notice this new idea *NOT EQ*. This involves two of Prolog's built-in primitives. As with other languages, there is a long list of them and they are best learned a few at a time.

EQ will either make a variable equal to a constant or test if two variables are equal.

```
((test X Y)
  (EQ X Y))
?((test X fred)(PP X))
```

will give:

```
fred
```

To demonstrate how you can use these two ideas

Turn to Page 89 ▶

Prolog stands for PROgramming LOGic and was first implemented in 1972 in Marseilles by Colmerauer and Roussell. It was designed to get away from machine procedure and move towards human logic to give a language that can be applied to almost any situation.

```
((brother X Y)
   (parent Z X)
   (parent Z Y)
   (NOT EQ X Y)
   (male X))
 ((which (X|Y))
   (FORALL ((? Y)) ((PP X))))
 ((sister X Y)
   (parent Z X)
   (parent Z Y)
   (NOT EQ X Y)
   (female X))
 ((grandfather X Y)
   (father X Z)
   (parent Z Y))
 ((parent X Y)
   (father X Y))
 ((parent X Y)
   (mother X Y))
 ((mother Queen-Mother Queen-Eliz2))
 ((mother Queen-Mother Princess-Margaret
))
 ((mother Queen-Eliz2 Prince-Charles))
 ((mother Queen-Eliz2 Princess-Anne))
 ((mother Queen-Eliz2 Prince-Andrew))
 ((mother Queen-Eliz2 Prince-Edward))
 ((mother Princess-Margaret Viscount-Lin
ley))
 ((mother Princess-Margaret Sarah-A-Jone
s))
 ((mother Princess-Diana Prince-William)
)
 ((mother Princess-Diana Prince-Henry))
 ((mother Princess-Anne Zara-Phillips))
 ((mother Princess-Anne Peter-Phillips))
 ((father King-George6 Queen-Eliz2))
 ((father King-George6 Princess-Margaret
))
 ((father Prince-Phillip Prince-Charles)
)
 ((father Prince-Phillip Princess-Anne))
 ((father Prince-Phillip Prince-Andrew))
 ((father Prince-Phillip Prince-Edward))
 ((father Lord-Snowdon Viscount-Linley))
 ((father Lord-Snowdon Sarah-A-Jones))
 ((father Prince-Charles Prince-William)
)
 ((father Prince-Charles Prince-Henry))
 ((father Mark-Phillips Zara-Phillips))
 ((father Mark-Phillips Peter-Phillips))
 ((female Sarah-A-Jones))
 ((female Princess-Diane))
 ((female Princess-Anne))
 ((female Princess-Margaret))
 ((female Queen-Eliz2))
 ((female Queen-Mother female))
 ((female Zara-Phillips))
 ((male Mark-Phillips))
 ((male Peter-Phillips))
 ((male King-George6))
 ((male Viscount-Linley))
 ((male Prince-Henry))
 ((male Prince-William))
 ((male Prince-Edward))
 ((male Prince-Andrew))
 ((male Prince-Phillip))
 ((male Lord-Snowdon))
 ((male Prince-Charles))
```

A Prolog database of the British Royal Family

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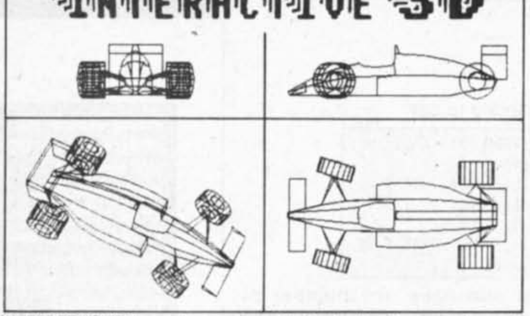

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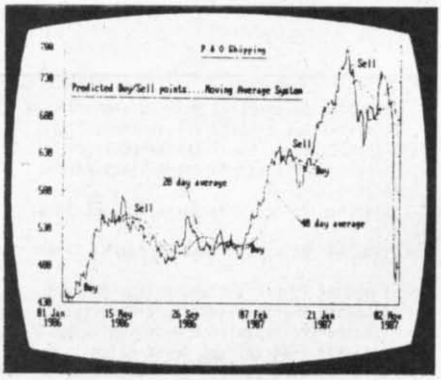

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◀ From Page 87

together the more complex:

```
((test2 X Y)
  (NOT EQ X Y)
  (PP Not equal))
((test2 X Y)
  (EQ X Y)
  (PP Equal))
?((test2 ted jim))
```

will output:

```
Not equal
```

and:

```
?((test2 fred fred))
```

will give:

```
Equal
```

You can now see how a complete family tree database can be built up. It requires data statements relating various members of the family, giving their sex, and also some rules which handle relations like brother, sister, uncle, nephew, grandparent and so on. Try to build a database for your own family and test it to see if it gives the expected answers.

The listing is for the British Royal Family, just to show how a family tree might look.

When you come to use your database, you will soon notice some interesting features. For instance, if you make a query like:

```
?((sister Princess-Anne
 X)(PP X))
```

which means, "Is Princess Anne anybody's sister?" You will get the reply Prince-Charles which is correct. However, it could also have been posed in this way:

```
?((sister X Prince-Charles)
 (PP X)|)
```

which means "Has Prince Charles a sister?" which would return Princess-Anne.

An important limitation may already have occurred to you: In neither of the previous queries have we seen any mention of Andrew and Edward, although Princess Anne is their sister too. To elicit this information we need another built-in primitive, FORALL:

```
?(( FORALL ((sister Princess
 -Anne X)) (( PP X)) )|)
```

means "For all the instances where it is true that Princess Anne is a sister, print out the last part of the term." You should see all her brothers listed.

As an alternative, we have included a clause called *which* from the dreaded SIMPLE interface – dreaded because it is anything but simple. This may be used in this way.

```
which ( X  ( sister|X))
```

The | sign indicates that sister is the head of a list and X is its tail or remainder.

This prints the tail of each clause of which *sister* can be the head. It cuts down the typing but, as you can see, it is anything but simple to understand. We will devote a lot more space to improving the querying facilities at a later stage – it can get a bit technical – but once it is working, you don't have to worry about it further.

Editing clauses

When adding in clauses you will need to make corrections from time to time. Let's suppose that you have added several *father* clauses to your family tree database:

```
((father bob jim))
((father bob harry))
((father bob helen))
((father harry mike))
((father harry jean))
```

But *harry*'s son is not called *mike* but *john*. Note that the offending clause is the fourth *father* one. If you type:

```
?((ED father 4))
```

you will see the offending clause displayed: Use the Copy and Delete keys to produce a corrected version. An alternative when the order does not matter would be to delete the offending one using:

```
?((DELCL father 4))
```

and type a new one which will appear as the last father clause.

Next you remember that *bob* has another daughter *sophie*. For tidiness you want this to go in as clause 3 so, to add a clause, you type:

```
?((ADDCL ((father bob soph
 ie)) 3 ))
```

To remove the whole father relation, enter:

```
KILL father
```

To clear everything, use:

```
KILL ALL
```

You can save all your work from one session with:

```
SAVE FAMILY
```

The second word is the name to save the data under. You can catalogue your disc with:

```
**CAT
```

But to catalogue drive 1 you need:

```
**"CAT 1"
```

All star commands are available, but if they are more than a single word they must be in quotes. You can load a separate database using:

```
LOAD FAMILY
```

The microProlog utilities disc contains an editor which may be loaded for extensive editing sessions. Or you can use a word processor – provided you are careful to avoid embedded commands and control codes.

● *In the second part of this series we'll take a look at artificial intelligence with a monkey, a box and a banana.*

> *Information can be retrieved quite easily*

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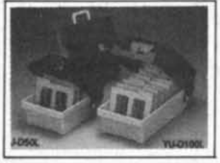

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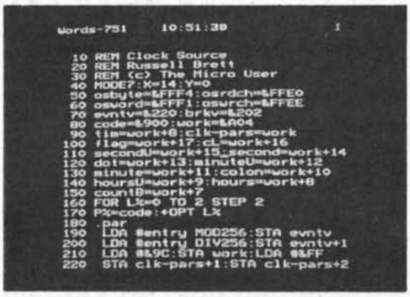
A word to the wise – keep an eye on the clock

Russell Brett provides an interrupt routine to display the time on your screen



```
Words-751     10:51:39               I

  10 REM Clock Source
  20 REM Russell Brett
  30 REM (c) The Micro User
  40 MODE7:X=14:Y=0
  50 osbyte=&FFF4:osrdch=&FFE0
  60 osword=&FFF1:oswrch=&FFEE
  70 evntv=&220:brkv=&202
  80 code=&900:work=&A04
  90 tim=work+8:clk-pars=work
 100 flag=work+17:cL=work+16
 110 secondU=work+15_second=work+14
 120 dot=work+13:minuteU=work+12
 130 minute=work+11:colon=work+10
 140 hoursU=work+9:hours=work+8
 150 countB=work+7
 160 FOR L%=0 TO 2 STEP 2
 170 P%=code:+OPT L%
 180 .par
 190  LDA #entry MOD256:STA evntv
 200  LDA #entry DIV256:STA evntv+1
 210  LDA #&9C:STA work:LDA #&FF
 220  STA clk-pars+1:STA clk-pars+2
```

IF you spend a lot of your time at the keyboard using Wordwise, or you simply can't bear to be in the same room as your micro without it being switched on, then try this program. It is a digital clock designed to be used from within Wordwise – which doesn't have the built-in timer feature of the Mini Office II word processor.

To print the time on the screen while using Wordwise demands programming techniques beyond those available in Basic. To begin with, the program is intended to be run concurrently with Wordwise so it is important that it does not block the normal functioning of the word processor.

In effect, the clock routine cannot have exclusive processor access, but it must appear as though it has, since we wish the time to be updated and displayed continually.

By now it is probably clear that it is necessary to either make use of an interrupt or event routine so the clock program can be called by some predetermined signal while the word processor is still running.

There is just such an event ideal for this application – number 5 which is associated with the in-built interval timer. The operating system has, very usefully, been designed so that every time the interval timer crosses zero, an event – a prepackaged interrupt – is triggered.

When this event is enabled the operating system jumps to the address contained in locations &220 and &221 – *evntv*. So the start address of the clock routine is placed in these locations and the operating system arranges for our program to be executed every time the interval timer crosses zero.

Type in the listing as shown and correct any typing errors using Get it Right! Save this program as CLK.SRC and then run it. The machine code clock routine will automatically be saved as CLOCK. You can then initialise it from disc by entering:

```
*CLOCK
```

As soon as the routine starts running a set of eight dots appears on the screen so that you can set up the correct time as follows:

```
hh:mm:ss
```

for hours, minutes and seconds – you can use any separator between the digits. To keep the program short there is no error checking, so take care – if you enter letters instead of numbers the routine will eventually crash.

```
 10 REM Clock Source
 20 REM Russell Brett
 30 REM (c) The Micro User
 40 MODE7:X=14:Y=0
 50 osbyte=&FFF4:osrdch=&FFE0
 60 osword=&FFF1:oswrch=&FFEE
 70 evntv=&220:brkv=&202
 80 code=&900:work=&A04
 90 tim=work+8:clk_pars=work
100 flag=work+17:cL=work+16
110 secondU=work+15:second=work+14
120 dot=work+13:minuteU=work+12
130 minute=work+11:colon=work+10
140 hoursU=work+9:hours=work+8
150 countB=work+7
160 FOR L%=0 TO 2 STEP 2
170 P%=code:[OPT L%
180 .par
190  LDA #entry MOD256:STA evntv
200  LDA #entry DIV256:STA evntv+1
210  LDA #&9C:STA work:LDA #&FF
220  STA clk_pars+1:STA clk_pars+2
230  STA clk_pars+3:STA clk_pars+4
240  LDX #5:LDA #14:JSR osbyte
250 .entry
260  LDA #1:STA flag
270  PHP:PHA:TXA:PHA:TYA:PHA
280  LDX #clk_pars AND255
290  LDY #clk_pars DIV256
300  LDA #4:JSR osword:LDA &355
310  CMP #7:BNE skipdis
320  LDA #&75:JSR osbyte
330  CPX #0:BNE skipdis
340  LDA #&86:JSR osbyte
350  TYA:PHA:TXA:PHA:LDA #0
360  STA flag:LDX #(X-1):LDY #0
370 .back
380  JSR tab:LDA countB,Y:INY
```

Turn to Page 92 ▶

Clock will operate on B, B+ or the Master series in Basic and Wordwise but not View.

It is not second processor compatible, and won't work on the Archimedes 6502 emulator.

◄ From Page 91

```
390  JSR oswrch:INX:CPY #10:BNE back
400 .skipdis
410  LDA secondU:CMP #ASC"9":BNE over
420  LDA #ASC"/":STA secondU
430  INC second:LDA second
440  CMP #ASC"6":BNE over2
450  LDA #ASC"0":STA second
460  INC minuteU:LDA minuteU
470  CMP #ASC":":BNE over2
480  LDA #ASC"0":STA minuteU
490  INC minute:LDA minute
500  CMP #ASC"6":BNE over2
510  LDA #ASC"0":STA minute
520  INC hoursU:LDX #255
530  LDA #213:JSR osbyte
540  LDA #7:JSR oswrch:LDA hoursU
550  CMP #ASC":":BNE over2
560  LDA #ASC"0":STA hoursU:INC hours
570 .over2
580  LDA hoursU:CMP #ASC"3":BNE over
590  LDA hours:CMP #ASC"1":BNE over
600  LDA #ASC"1":STA hoursU
610  LDA #ASC"0":STA hours
620 .over
630  INC secondU:LDA flag:BNE miss
640  LDA #31:JSR oswrch:PLA
650  JSR oswrch:PLA:JSR oswrch
660 .miss
670  PLA:TAY:PLA:TAX:PLA:PLP:RTS
680 .tab
690  LDA #31:JSR oswrch:TXA
700  JSR oswrch:LDA #Y:JSR oswrch
710  RTS:]
720 REM
730 REM INPUT ROUTINE
740 REM
750 P%=&A16
760 [OPT L%:.par:.bef
770  LDX #ASC".":JSR ba
780  LDX #8:JSR ba
790  LDA #ASC" ":STA tim-1:LDY #0
800 .go
810  JSR osrdch:JSR oswrch
820  BCS go:STA tim,Y:INY
830  CPY #8:BNE go:LDA #152
840  STA tim,Y:BCS continue:RTS
850 .continue
860  LDA #code MOD256:STA brkv
870  LDA #code DIV256:STA brkv+1
880  LDX #76:LDA #247:JSR osbyte
890  LDX #code MOD256:LDA #248
900  JSR osbyte:LDX #code DIV256
910  LDA #249:JSR osbyte:JMP code
920 .ba LDY #0
930 .ba2 TXA:JSR oswrch:INY
940  CPY #8:BNE ba2:RTS
950 ]:NEXT
960 $&700="SAVE CLOCK "+STR$~code+"+20
0 "+STR$~bef
970 PRINT $&700
980 X%=0:Y%=7:CALL&FFF7:PRINT"Done"
```

Get it right!

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 5FF0 0
 50 = C8E7 E
 60 = 5215 3 370 = 5C49 C 680 = E523 3
 70 = F96C A 380 = D33F 2 690 = 42EF 4
 80 = D6EB 5 390 = 8EA0 A 700 = 4A27 9
 90 = D96D 6 400 = 6E18 D 710 = 88E3 B
100 = 9EDA F 410 = E9CB 8 720 =    0 B
110 = 4EA7 7 420 = D338 0 730 =    0 B
120 = 1D23 8 430 = F329 8 740 =    0 B
130 = E547 4 440 = B10A 4 750 = EB71 D
140 = 16C0 0 450 = B9B2 C 760 = DED5 E
150 =  C73 D 460 =  1BE 6 770 = 6C33 4
160 = AAB9 2 470 = A776 A 780 = 6E0D C
170 = 7CBB 8 480 = 6557 9 790 = E42E C
180 = 2BD2 F 490 = 949A 3 800 = 9233 4
190 = 58D1 4 500 = B10A 6 810 = 7F9C B
200 = E04D 1 510 = E903 9 820 = 8657 7
210 = 9CDD 3 520 = 7D4A D 830 = DB87 3
220 = D3EC 9 530 = BE80 5 840 = F91A C
230 = F343 1 540 =  588 C 850 =  2EE 0
240 = 4AA6 2 550 = A776 C 860 = 9D6E E
250 = F1E5 2 560 = BDCD 6 870 = 5268 0
260 = 816C 7 570 = A4D3 C 880 = DC11 9
270 = A5E9 3 580 = 2493 1 890 = 6820 9
280 = 87F2 F 590 = 7FC3 D 900 = 766F C
290 = 6901 4 600 =  D08 A 910 = C62D 6
300 = 9279 5 610 = 5EF9 5 920 =  6D7 7
310 = B73B 2 620 = 8A82 B 930 = F1D5 F
320 =  187 0 630 = F51F 6 940 = D3FF 3
330 = A6CD 7 640 = 5198 7 950 = DA42 3
340 = C54A C 650 = 862D A 960 = 2769 3
350 = 3267 4 660 = B14C 9 970 = 4067 8
360 = 741D 9 670 = 3B90 B 980 = 740C 3
```

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Feature	ADE +	BBC Basic	MACROM
Number of pseudo-ops	64	4	36
Use of all available RAM	Yes	No	No
Macros	Yes	No	Yes
Relocatable output	Yes	No	No
Linker with libraries	Yes	No	No
High level constructs	Yes	Yes	No
Number of error reports	39+warnings	3+BASIC errs	20
65C00 extended opcodes	All	65C 12 only	65C 12 only
Switch of 65 C 12 opcodes	Yes	No	No
ROM size	32K	16K	16K
Disassembler	Yes	No	Yes
Label restrictions	No	Yes	Yes

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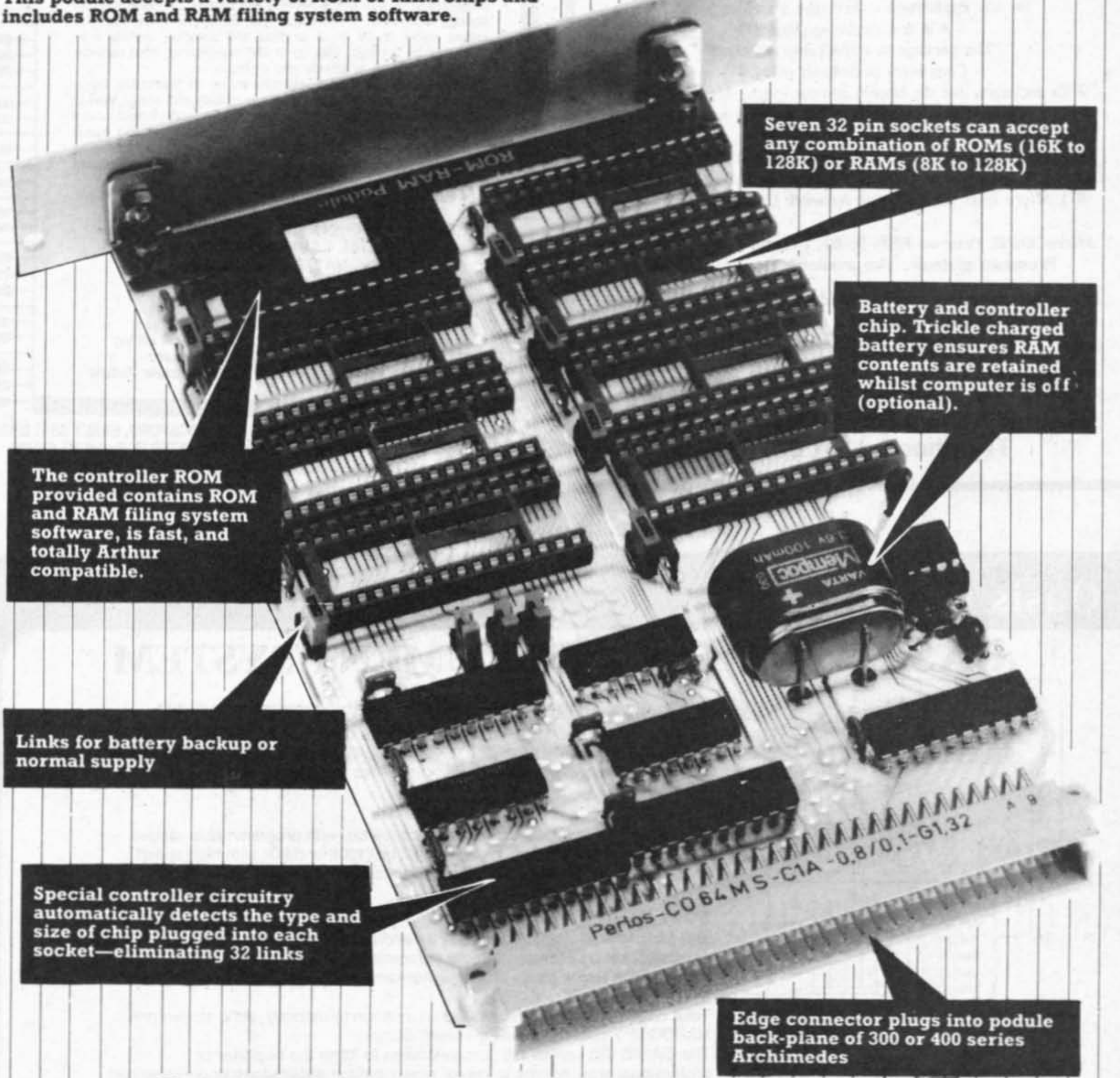
ROM/RAM PODULE

This podule accepts a variety of ROM or RAM chips and includes ROM and RAM filing system software.



Seven 32 pin sockets can accept any combination of ROMs (16K to 128K) or RAMs (8K to 128K)

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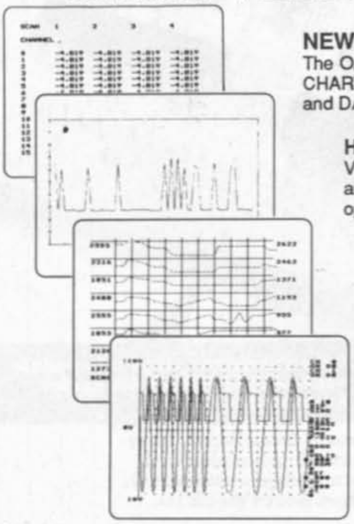

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VIS includes a precision 16 channel A-D converter, with programmable ranges and read rates of 50k R/s at 8 bit, 25k at 12 bit (100k and 60k with high speed option). This simply installed unit has proven long term stability and reliability.

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Design Consultancy

Chinese Chess

Daniel Tang's version of this traditional game has the flavour of a fast food chain. And it's fun, too.

IN this excellent version of the traditional Chinese Chess you can play against another player or your BBC Micro – which incidentally plays very well indeed. You use animals as chessmen, and the object is to occupy your opponent's den – see Figure I – with one of your eight animals while stopping your opponent from occupying yours.

Each animal has its own ranking in the food chain as follows:

Animal	Rank
Elephant	1
Lion	2
Tiger	3
Leopard	4
Wolf	5
Dog	6
Cat	7
Mouse	8

An animal can eat the ones below it in the food chain. A dog can eat a cat and a mouse, a wolf can eat a dog, cat or mouse and so on. The exceptions are mice, which can eat elephants, and elephants, which cannot eat mice.

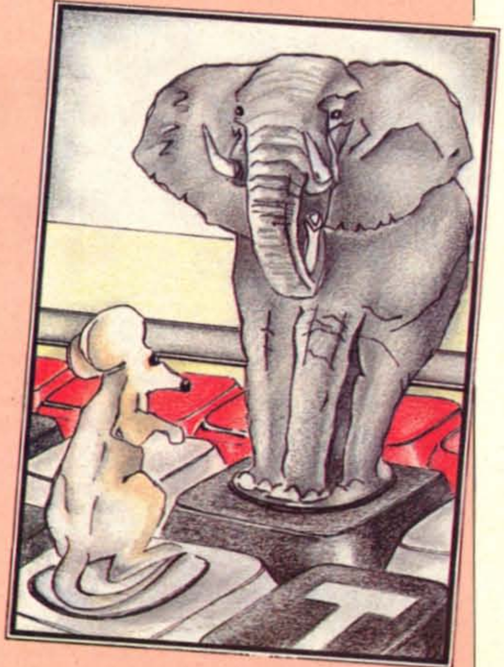
All the animals can move one square left, right, up or down. Lions and tigers can jump over the water horizontally but not vertically and mice can swim in the water.

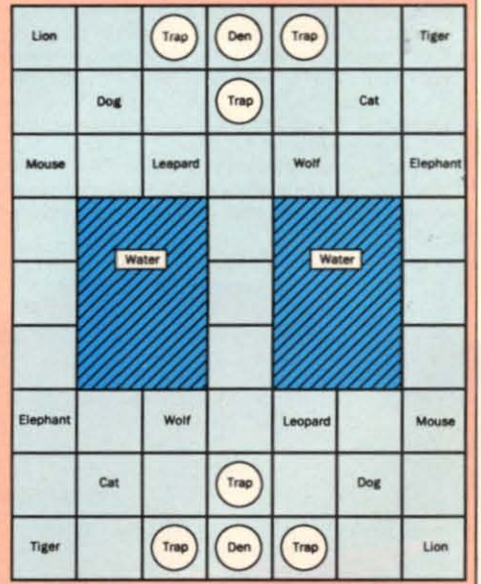
Surrounding the dens are three circles: These are traps. An animal in one cannot be eaten, so filling them with animals can be a way of guarding your den and keeping safe animals that are not doing anything else.

The program is in two parts. The first defines the graphics for the animals and the second plays the game. Type in Listing I and correct any typing errors using Get it Right! Then save it as Chess1 – you can run this program alone to test it. Type NEW and enter Listing II, again putting any of your typing errors right with the checksums and save this one as Chess2. To play, run Chess1 which automatically CHAINs Chess2.

If you have chosen the one-player game your pieces are the white ones at the bottom of the screen and the micro's are the blue ones at the top. For the two-player game, the first has the white animals and the second has blue. In both games there is a cursor which is moved using:

Z	Left
X	Right
*	Up
?	Down
Return	Select





Lion		Trap	Den	Trap		Tiger
	Dog		Trap		Cat	
Mouse		Leopard		Wolf		Elephant
	Water			Water		
Elephant		Wolf		Leopard		Mouse
	Cat		Trap		Dog	
Tiger		Trap	Den	Trap		Lion

Figure I: The playing area and starting positions

Listing I

```
10 REM Chinese Chess
20 REM By Daniel Tang
30 REM (c) Micro User
40 MODE7:PROCkeys
50 MODE1:VDU19,2,6;0;
60 VDU23;8202;0;0;0;
70 PROCchars:MODE7
80 CHAIN"CHESS2"
90 DEF PROCpchar(X%,Y%,C%)
100 X%=X%-1:Y%=Y%-1
110 W%=&8FF+72*(C%-1)
120 M%=&3008+X%*64+Y%*&780
130 FOR X%=M% TO M%+&500 STEP 640
140 FOR Y%=X% TO X%+32 STEP 16
150 FOR C%=Y% TO Y%+7
160 W%=W%+1:Z%=?W%
170 ?C%=?C%EOR(Z%AND&F0)
180 C%?8=C%?8EOR(Z%AND&0F)*16
190 NEXT:NEXT:NEXT:ENDPROC
```

Turn to Page 147 ▶

Cutting cost of comms

Steve Gold looks at two new money-miser MicroLink modems

UNTIL quite recently the price of modems capable of 1200/1200 baud full duplex – known as V22 in communications parlance – placed them beyond the reach of many home communications enthusiasts. This was due, in part, to the price and relative scarcity of the chip set sitting at the heart of such modems.

Lower speed ones – 300/300 and 1200/75 baud – use a different method of encoding the BBC Micro's serial output on to the modem, so in a multi-speed unit two chip sets are required – one for the 300/300 and 1200/75 baud rates and one for V22 and above.

Now MicroLink has launched a dual speed modem – 300/300 and 1200/75 baud – with a price tag of £99 and a multi-speed one – V22 – costing just £169. And, as if that wasn't enough, they both come with lead, free software, free subscription to the MicroLink service and the first month of use free of charge as well. The last is worth at least £20 to a typical MicroLink user – and quite probably a lot more.

It brings the MicroLink multi-speed modem down to the same price level as earlier lower-speed modems – an amazing feat. So let's look at the hardware in more detail.

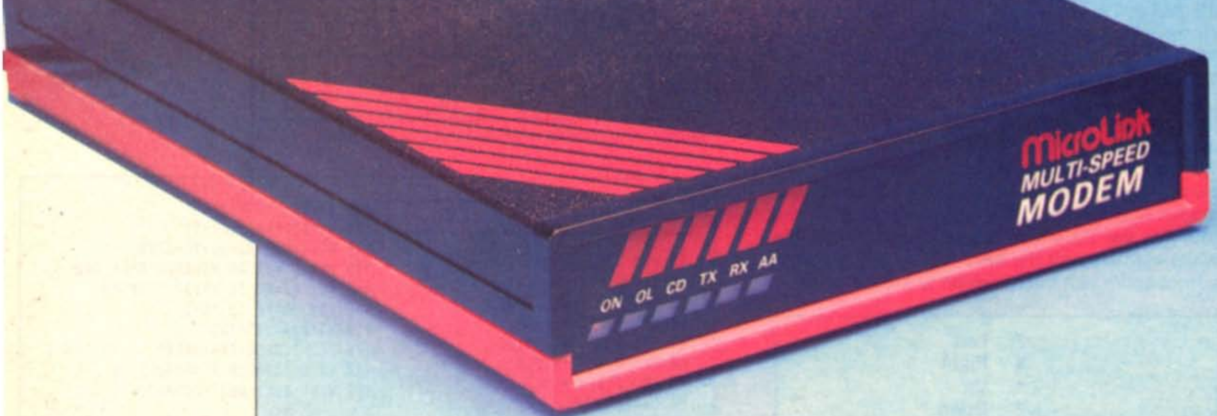
The modem is colourful and, unlike many others, the MicroLink unit looks quite snazzy in red and black livery. The front panel has a group of six LED status lamps on the left, while the rear of the unit has a fixed telephone cable for connection to a standard BT series 600 wall socket. Provision is made for the onward connection of a standard BT phone through a socket on the rear.

Power is supplied by an external moulded 240v mains adapter which plugs into the back via a round DC power connector.

Snugly alongside the phone and power connections is a 25 way serial – RS232C – port. As is usual with such connectors, the socket is of the female variety and the cable to connect it to your BBC Micro is supplied with the package – itself a saving of between £5 and £8.

Preparing the modem involves plugging the mains adapter into the power socket, connecting it into a BT wall socket and linking a phone to the modem itself. The final connection is made by linking up the BBC Micro with the supplied serial cable.

When you switch the modem on, the left-most



of the six LED lamps on its front fascia glows brightly. This indicates that it has powered up correctly, but not that the micro is communicating with it. This connection is tested by loading the communications software, selecting communicate and keying the Hayes command prefix AT followed by Return. If all is correct, OK will appear on your screen.

Having put the modem heavily through its paces for this review, I can report that the unit is as Hayes compatible as is possible for one which also supports 1200/75 baud – a rate not included in the official Hayes standard in the US.

Controlling its functions proved to be easy using the software supplied. Connecting to other multi-speed modems with any multi-speed modem like the MicroLink unit can prove a little tedious, since each dutifully scans up and down the available baud rates looking for a steady carrier to lock on to.

Listening to two such modems attempting to lock on to each other is a bit like walking down a packed street. As you bear slightly left to avoid a shopper bearing down on you at a fair rate of knots, so he bears slightly to the right. As you duck and weave, so it seems that your opposite number compensates against your every move. My own solution in the street is to stick to the direction in which I am travelling and let the other person get out of the way.

The communications equivalent of this problem for Hayes-compatible modems is to reset one or more S registers so speed seeking is disabled and it is locked on to a single baud rate.

Setting any modem internal software up is a little time-consuming, and the MicroLink one solves the problem in one of two ways: Either you disable the speed-seeking facility and write the new parameters to the modem's non-volatile memory, or you add a dialling suffix to the modem ATD command to indicate that you wish to override the auto-configuration software.

One possible problem a few users may encounter – myself included – is that the power supply is housed in the plug unit itself and adds considerably to its size.

This means that if the power unit is to be used in houses with sockets low down on the skirting board, or multiple power outlets in a back-to-back matrix, some juggling is required. My own solution was to buy a two-way mains adapter and use it to move the socket further back from the wall, allowing more room for the unit to be plugged in.

The included software is derived from the communication and word processing modules of Mini Office II – the best-selling integrated business office software for the BBC Micro. It performs well and I'll be looking at it in more detail next month.

The A5-sized manual proved to be excellent and well-thought out. It is split into several distinct sections – including a quick-start preface for newcomers to comms – and gives precise details of the modem's many functions. The only thing I missed was the lack of an alphabetic index at the back, but the comprehensive chapter details in the manual go some way towards compensating for this omission.

The MicroLink multi-speed modem looks unbeatable with its current £169 price tag. Even if you don't need the freebies offered with it, judging by current retail prices, the hardware alone is worth almost £100 more.

Price: £99 (dual speed), £169 (multi-speed)
Supplier: MicroLink Communications Ltd, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP
Tel: 0625 878888.

Points for:

- **Low price**
- **Software and lead included**
- **Free month on MicroLink**

...against:

- **No index in manual**
- **Bulky power unit**

The bottom line...

Excellent value for money even if you don't need the free offers that come with them.

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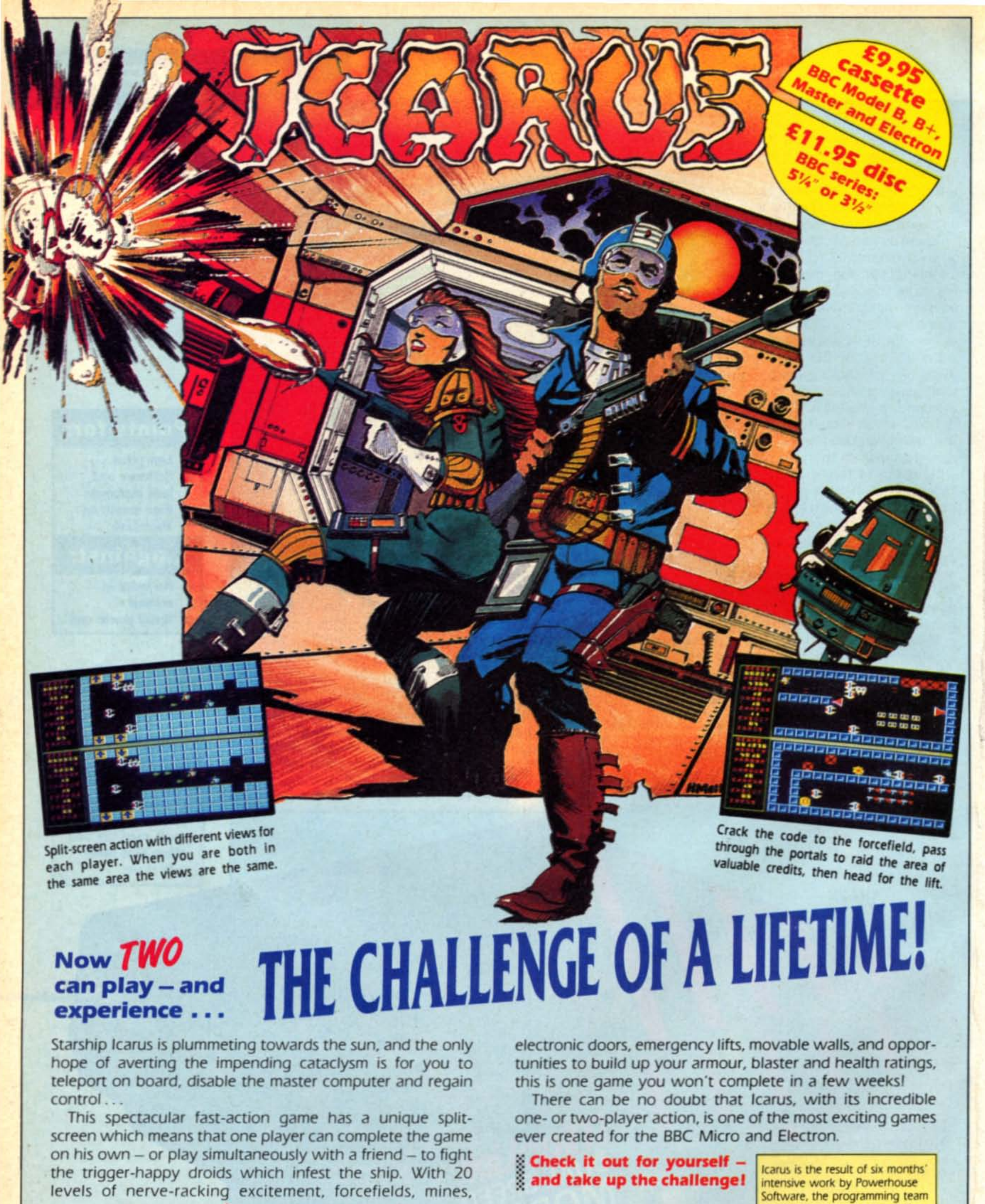
Carrier
Power
IN for 1200/75
OUT for 300
MicroLink
DUAL-SPEED
MODEM



Split-screen action with different views for each player. When you are both in the same area the views are the same.

Crack the code to the forcefield, pass through the portals to raid the area of valuable credits, then head for the lift.

Now *TWO* can play – and experience . . .

THE CHALLENGE OF A LIFETIME!

Starship Icarus is plummeting towards the sun, and the only hope of averting the impending cataclysm is for you to teleport on board, disable the master computer and regain control . . .

This spectacular fast-action game has a unique split-screen which means that one player can complete the game on his own – or play simultaneously with a friend – to fight the trigger-happy droids which infest the ship. With 20 levels of nerve-racking excitement, forcefields, mines, electronic doors, emergency lifts, movable walls, and opportunities to build up your armour, blaster and health ratings, this is one game you won't complete in a few weeks!

There can be no doubt that Icarus, with its incredible one- or two-player action, is one of the most exciting games ever created for the BBC Micro and Electron.

Check it out for yourself – and take up the challenge!

Icarus is the result of six months' intensive work by Powerhouse Software, the programming team which developed the top-selling Dunjunz. A full three months has been spent play-testing and fine-tuning to produce an addictive challenge with a gameplay that's really out of this world!

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CEEFAX Guide

B B+ M

Software is currently transmitted for a period of one week. The teachers' notes for the TV series Issues *are transmitted from Wednesday to the following Tuesday and all other files are updated on Fridays. There will be periods during the update day when the files are unavailable. The program details given are provisional.*

April 1 to 7

T/OSB20 **B/OSB20**

Osbits is a 26-part course to help you understand BBC Micro assembly language. Module 20 looks at real numbers and shows how to achieve fixed point arithmetic and the accompanying program – B/OSB20 – uses Basic integers to illustrate a simple fixed point system.

T/SWR22 **RFSgen**
AutoRFS **Demo**

This weeks' module looks at the rom filing system – an alternative to disc or tape – and can store programs and/or data there either permanently on an eprom or temporarily in the volatile sideways ram.

AutoL

ATS has a very user friendly way of downloading the telesoftware broadcasts but AutoL makes this process even simpler, and automatic.

ScopeD

More data files to accompany last month's broadcast of the Datascope suite of programs.

SSTrade

Step back in time and become the captain of a trading ship sailing the South China seas. This one-player game involves a lot of skill.

Minicom

Speed up your graphics routines with this Basic compiler from the March 1988 issue of *The Micro User*.

April 8 to 14

T/OSB21 **B/OSB21**

The osbits course continues with a further look at real numbers, and demonstrates an algorithm to plot a crude diagram showing the Mandelbrot Set. This is explained in the text file T/OSB21.

T/SWR23 **RFSgen**
AllRFS **Demo**
RFShead

T/SWR23 offers a more complex header for roms containing RFS software. Such a header is only required in one of the RFS roms, and includes extended HELP messages, auto-boot feature and a new star command to run programs. Detailed instructions are included for novice Basic programmers.

ETFS

Using teletext on an Econet system simply requires one BBC Microcomputer System Teletext Adapter and this Econet file server software. All the normal teletext facilities are then available from any station on the network, and even across a network bridge.

Eclipse

This is a program based around the concept of several membanks. It can be used to store notes, messages, program sections, complete machine-code routines, Macro commands or any other data. It can act as an extended function key and the contents are retained over a hard break, and can be accessed from any programming language. Eclipse also provides a host of other features.

Bingo

This program, from the March 1983 issue of *The Micro User*, simulates a bingo number selecting machine. It prints the numbers on screen, small for the caller, large for the audience and has recall facilities.

April 15 to 21

T/OSB22 **B/OSB22**

This week's osbits module continues the study of performing mathematical functions from machine code with a look at floating point arithmetic. The text file T/OSB22 shows how the addition and subtraction procedures – as applied to integer numbers – must be altered for use with floating point values.

T/SWR24 **RFSgen**
ModOne **Demo**
ModTwo

A look at how to overcome the problems of assembling up to 16k or more of code residing in sideways ram when the BBC Micro leaves as little as 8.75k for the source code.

Cities **Note**
Dist

Calculate the shortest distance between any two cities – enter their names, and the length of the journey between them will be shown. Alternatively, if the chosen positions do not appear on the comprehensive list of cities available, just enter the longitude and latitude of the two points in question.

TeleCat

An alternative automatic file downloading system that requires minimal interaction between you and the computer to instigate the downloading of all the files you want from the telesoftware broadcasts.

Strike

Zap four types of nasties in Air Strike: A fast, furious and very colourful arcade extravaganza from the May 1983 issue of *The Micro User*.

April 22 to 28

T/OSB23 **B/OSB23**

Osbits part 23 continues the study of floating point arithmetic with a description of multiplication and division using the BBC Micro assembler.

T/SWR25

The concluding part of the series explaining the mysteries of sideways ram offers a complete index to all 24 modules.

DT **Text**

A traditional adventure based on role-playing fantasy games. Your objective is to escape, but you must first destroy the Demon's Tomb.

Circuit **Divide**
Bridge **RCL**

Circuit allows the analysis of electronic circuits containing resistors, inductors, capacitors, current and voltage sources. The details to be analysed are entered in text form and can be studied under the influence of either a DC or AC supply.

Pipeline

Re-build the plumbing in this popular game from the March 1988 issue of *The Micro User*.

April 29 to May 5

T/OSB24 **B/OSB24**

Osbits continues with a brief overview of sideways roms. For those not following the series, T/OSB24 offers a description of the principles of paged roms and briefly lists the service calls that pass through them.

PROCON **PR/Info**

This is a rom image suitable for loading into sideways ram or blowing into an eprom. It offers a range of useful additional star commands:

*AMEND allows you to amend the load or execution addresses of any file held on disc
*CONV converts between decimal, hexadecimal and binary numbers
*DKEY displays the Ascii, hexadecimal or binary value of any key pressed
*MSEED fills a specified section of memory with any given byte
*RCOPY and *SCOPY give very versatile file copying facilities.

CYMRAEG **DATAUN**
CREWR **DATADAU**
GEIRIAD **PEDWAR**
SAESNEG **MEISTR**
HYFFOR

Use BBC Basic, but program in Welsh. This amazing utility will allow you to translate your existing Basic I, II, or IV into Welsh by producing a sideways rom image of the Welsh version. From then on, use the Welsh Basic keywords as listed in the two dictionaries – GEIRIAD and SAESNEG.

Kong

Fly your helicoptor to rescue King Kong's victims, but watch out for those deadly rocks in this action-packed game from the April 1983 issue of *The Micro User*.

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● Econet Network Board	£43
● Backplane for 2 podules, with fan (305, 310)	£39
● I/O Podule (with User port, Analogue port & 1MHz bus)	£79
● MIDI add-on to I/O Podule	£29
● ROM Podule (takes five 8 bit ROMs, of 16, 32, 64 or 128K)	£59
● Real time Video Digitiser (Watford)	TBA
● Sound Sampler (Armadillo)	£110

WORDPROCESSORS

Wordwise +	£20	View	£50
Graphic-Writer	£26	Viewspell	£32
Interword ROM	£39	ViewIndex	£13

DATABASES

System's Delta Plus	£60
AlphaBase	£43
Viewstore	£52

SPREADSHEETS

Intersheet ROM	£39	Viewsheet	£50

BUSINESS GRAPHICS

Interchart ROM	£25
GammaPlot	£30

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet, Time Management & Business Graphics £95

GRAPHICS, ART & DESIGN

Interchart	£25	Gamma Plot	£30
Artisan	£34	Gamma Plus	£60
Zarch	£17	Toolkit (Beebug)	£33

PC EMULATION Pack

(for 310, 410 & 440), including MSDOS 3.21 £89

LANGUAGES

ANSI 'C'; ISO-PASCAL; FORTRAN 77;	£95 each
Cambridge LISP; PROLOG X	£199 each

TWIN EDITOR £29

SPECIAL OFFER

With every Archimedes Micro purchased from us, we are giving away absolutely **FREE** a 5¼", double sided disc drive with PSU, (1 Megabyte unformatted), plus the special Archimedes interface cable, worth **£125**.
(P.S. This offer does not apply with 0% finance scheme mentioned below).

0% (APR) FINANCE

*For a limited period, Watford Electronics are able to offer the Archimedes range of microcomputers at **0% (APR)** finance. Credit facility available subject to status. Please inquire for further details.*
(Watford Electronics are Licenced Credit Brokers)

NEW

CREDIT TERMS now available. Please telephone or write in for further information.

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.
By far the easiest way to transfer data to your new computer.

Only £25

Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. Upto FOUR drives can be connected and NO SOLDERING is involved. Supplied complete with necessary lead.

Only £25

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Archimedes.

Archimedes Printer Lead	£8.50
Archimedes Monitor Lead	£7.50

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. This is a complete package, with its own power supply, ready to interface with your BBC Micro. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£259

BBC MASTER

BBC MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL **£379**

SPECIAL OFFER

FREE . . . £105 worth of Hardware & Software

*Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and **Watford's** 3½", double sided 1 Megabyte (unformated) single disc drive complete with cables, ready to connect to the micro – with every BBC Master purchased from us this month.*

BBC MASTER with Turbo Board + above SPECIAL OFFER	***£475***
512K Processor Add on Board "inc. Mouse and GEM package"	***£185***
BBC AIV (Domesday) System	***£4479***

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£95
Econet Module for the Master	£40
Twin ROM Cartridge for Master	£7.50
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref. Manual	(No VAT) £19
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£41
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
ARIES' Professional IEEE Interface	£238
Acorn IEEE Interface Complete	£265
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01	£825
Filestore E20	£705

BBC MASTER COMPACT

All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled software.

System 1	Standard Package	£310
System 1A	System 1 + TV Modulator	£322
System 2	System 1 + Green Hires Monitor	£364
System 3	System 1 + Medium Res Colour Monitor	£478
RS232 Kit for BBC Compact		£25
Additional 3½" Drive for BBC Compact		£90

(Securicor carriage £7)

Watford Electronics are the main Approved Stockist of ACORN SPARES and ECONET Referral Centre

Z88 Sinclair's Portable Micro

FREE **Price:£239**

As an introductory offer, we are giving away, 4 rechargeable batteries and a compact Mains Battery Charger absolutely FREE with every Z88 bought from us this this month.

ACCESSORIES

Mains Adaptor	**£8.65**
32K RAM Pack or 32K EPROM Pack	**£17.35**
128K RAM Pack or 128K EPROM Pack	**£43.40**
Z88 BBC or PC Link	**£21.70**
Z88 EPROM ERASER	**£34.75**
Serial Printer Cable	**£8.65**
Parallel Printer Cable	**£24.00**
Z88 Modem	**£86.90**
AA Nicad Rechargeable Battery	**£1.50**
Battery Charger, Compact & Fast (3 Hours)	**£6**

65C102 2nd PROCESSOR

(65C102 replaces the original Acorn 6502 2nd Processor)

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

£135

CO-PRO Adaptor

CO PRO ADAPTOR

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£35 (carr £5)

NEW

BBC PCB DESIGNER

At last! A PCB design package for the BBC Micro that eclipses some industry CAD software. Hard to believe, isn't it? Just look at some of the impressive package specification:

- Library Component Designer
- Component Library (over 200 parts)
- Component List Editor
- NetList Editor
- PCB Board Designer
- Plotter Driver
- Dot Matrix Printer Driver

This integrated suite of programs is packed full of sophisticated PCB related features making the design of a circuit board a dream instead of a nightmare.

Input for the design may be manual, taking components from the library and connecting them, or highly automatic starting from a netlist and list of components. In auto mode, PCB Designer will never allow you to forget a connection again! And of course, either in manual or auto mode, connectivity is maintained no matter how you later move the parts around and route the tracks. Connections snap together and angles are corrected, Through hole vias and track thickness are established automatically and many more features, far too numerous to mention here, are included in the system.

Some of the PCB Designer's features are:

- Over 120 library pad sizes/shapes
- Four colour adjustable palette
- Zoom range 2:1 to 1:4
- Highlighting of specific tracks
- Normal and surface mounted components
- Rapid screen review
- Menu driven
- Variable gridlock
- Switchable measurement grid
- Pre-select pan/scroll facility
- Large 24" x 24" Board size
- Copy route facility
- Connectivity held at all times
- Ratsnesting of part connections
- Auto-plaement of text references
- Text linked to parts
- Automatic placement of vias
- Printer and plotter outputs provided
- Comprehensive manual

TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degres rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

BBC PCB Designer is supplied on a 32K PAL PROM and comes complete with two discs and a comprehensive manual containing examples and useful information on PCB design.

By the way, as a bonus, PCB Designer is also suitable for many other schematic drawing applications such as circuit diagram drawing.

Introductory Offer: £99

(Please write in for further technical details)

SPECIAL OFFER

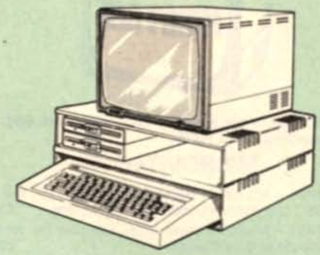
EPROMs for BBC's Sideways ROMs.

2764-250nS £3.00
27128-250nS (12V5) £3.25
27128-250nS (21V) £4.50

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £2.75
2 × 6264LP (16K) £5.30

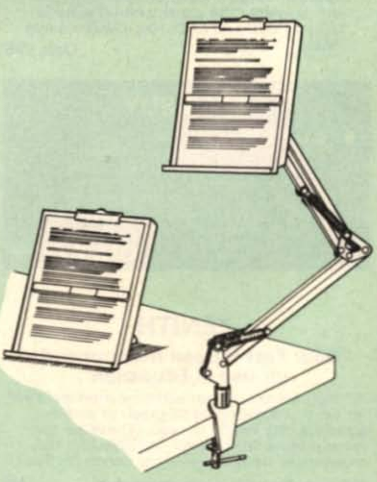
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only

Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

Continued →

All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14″

1431 – Standard resolution as used on the BBC television computer programme	£175
1451 – Medium resolution, suitable for word processing in mode 0	£225
1441 – High res, exceeds the capabilities of the BBC micro	£359
1431AP RGB + PAL and AUDIO	£199
1451AP RGB + PAL and AUDIO	£255
2030 CS 20″ Med Res	£380
2040 CS 20″ Hi Res	£675
Dust Cover for Microvitecs	£5.50
Touchtec 501 Touch Screen	£239

TAXAN 12″ & 14″

TAXAN Super Vision 2 Type 620 Hi-res RGB Colour monitor. Ideal for Wordprocessing	£269
TAXAN Super 3, Type 625 Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue	£319
TAXAN 14″ Multisync 770 Plus – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes	£495

- **NEC JC-1401P3EE 14″** Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. £495

- **Philips BM7542 12″ Paper White** Attractively finished high res monitor. Has an etched glass anti-glare screen and a tilt stand for optimum viewing angle. 1000 x 850 pixels resolution coupled with high contrast makes it ideal for both word pro and graphics. The paper white display is ideal for DTP and CAD. Has a Video/Audio input. **Only £65**

STAR BUY

- **PHILLIPS 14″** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £195

ZENITH

"Now Test Bureau Recommended for use in Education"

12″ high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Sys.)

Green (New Design) Hi-resolution	£66
Amber (New Design) Hi-resolution	£70

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3

SWIVEL BASES

for Video Monitors

Our professional type swivel bases have front adjustable control. This alleviates the need to lift the monitor when adjusting the viewing angle.

for 12″ Monitors **£9** (carr. £2.50)

for 14″ Monitors **£12** (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12″ & 14″ VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks. **£12**

Acorn-Olivetti JP101 Ink Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**

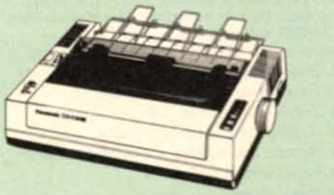
(Offer valid while present stocks last)

JP101 accepts 9½″ standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

Pack of 4 refills **£12**

Screen Dump ROM for JP101 £11

Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£145** (carr. £6)

Optional RS232 Interface: **£39**

Panasonic KX-P1082

This superb printer is very similar to the popular KX-P1081 printer but at 160 cps (40 cps in NLQ), a lot faster.

(Our LOW price also includes £35 worth of FREE BBC Cable and Dump Out 3 ROM).

Introductory Offer: **£172** (carr. £7)

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional, logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£234** (carr. £7)

Single Sheet Feeder	£175
Tractor Feed	£90

FREE 32K extra Printer Buffer with every KX-P3131 purchased from us this month.

NEC P2200 PINWRITER

24 pin head; 168 CPS, LQ 56 CPS, 8K Buffer, Tractor/Friction feed. Numerous typefaces. **£285**

Cut Sheet Feeder **£59**

NEC P660 PINWRITER

24pin; 216 CPS, LQ 76 CPS, 8K Buffer **£425**

VARIOUS PRINTERS & ACCESSORIES

Brother HR15 RS232 Daisy Wheel	£275
Brother HR20 Daisy Wheel	£349
HR20 Tractor Feed Attachment	£110
Epson EX800 Printer	£395
Epson EX1000 Printer	£539
Epson FX800 Printer	£295
Epson FX1000 Printer	£399
Epson LQ500 Printer	£275
Epson LQ800 Printer	£399
Epson LQ850 Printer	£439
Epson LQ1050 Printer	£529
Epson LQ2500+ Printer	£790
Epson LX800 Printer	£186
Epson SQ2500 Printer	£975
Epson Paper Roll Holder	£17
EX800/1000 Colour Option	£55
EX800/1000 Colour Ribbon	£18
EX800 Cut Sheet Feeder	£130
EX1000 Cut Sheet Feeder	£195
FX/LQ/LX800 Single Sheet Feeder	£135
FX/LQ1000 Single Sheet Feeder	£169
Hi-80 Refills – Set of 4 Pens	£7
LX800 Cut Sheet Feeder	£75
LQ800 Tractor Feed	£44
LQ1000 Tractor Feed	£50
LQ2500 Cut Sheet Feeder	£195
LX1000 Cut Sheet Feeder	£305
Hitachi 672 Colour Plotter	£475

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	£27	RS232 + 2K Buffer	£52
IEEE 488	£65	RS232 + 8K Buffer	£62

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	**£249** (carr £7)
Kaga KP915 Printer	**£350** (carr £7)
RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 16K Buffer	£89

INTEGREX COLOUR JET PRINTER

Colour Jet 132 Printer	£525
Paper Roll	£6
Screen Dump Software	£10
Colour Cartridge	£14
Black Cartridge	£8
100 A4 OHP transparencies	£55

PRINTER SHARERS

(Ideal for School environment)

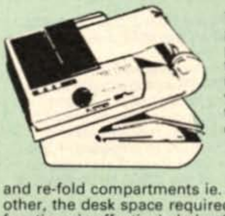
Connects	Serial	Centronics
2 BBC Micros to 1 Printer	£25	£27
3 BBC Micros to 1 Printer	£36	£35
6 BBC Micros to 1 Printer	–	£99

PRINTER CHANGER

3 Printers to 1 Micro (Centronics) **£65**

(Cables extra, specify type required when ordering)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£26 (carr. £2.50)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, Panasonic etc. printers.

Standard length (4 feet long)	**£6**
Extra long (6 feet long)	**£8**
Compact's Special Centronics Lead	**£9**
RS232 Cable	**P.O.A.**
IBM Parallel 1 metre Cable	**£7**
Double ended 36 way Centronics Lead	**£9**

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
RX/FX80/85/800/MX80	£4.00	£4.95
RX/FX100/1000	£7.00	–
Kaga/Texan KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86	£4.00	£4.50
LX800	£4.00	£4.75
M1009/GLP	£4.00	£3.75
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Star NL10	£4.00	£4.50
Microvitec Metal	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

● 1,000 Sheets 9½" × 11" Fanfold Paper	£7
● 2,000 Sheets 9½" × 11" Fanfold Paper	£12
● 1000 Sheets 9½" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" × 11" Fanfold Paper	£9
● 1000 Sheets true A4 Fanfold Paper	£11
● 2000 Sheets true A4 Fanfold Paper	£20
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	**£5.00**
1,000 90 × 36mm (Twin Row)	**£4.90**
1,000 90 × 49mm (Twin Row)	**£7.50**
1,000 102 × 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

MEGABUFFER 256

CLEAR
PAUSE / COPY
STATUS
EMPTY
FULL
256K PRINTER BUFFER

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr £2)

OFFICE MASTER

Office Master

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

Office Mate

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

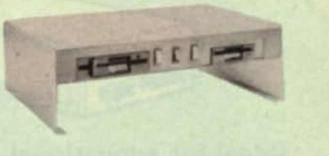
SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers

Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25 inch disk drive is 40/80 track switchable, and has its very own power supply running independently of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

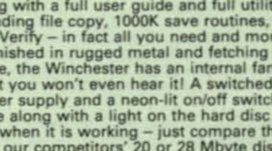
OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£139**

BBC Screen Dump	**£10**
Colour Ribbon	**£6**
Black Ribbon	**£6**

30 Megabyte Winchester Drive



Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

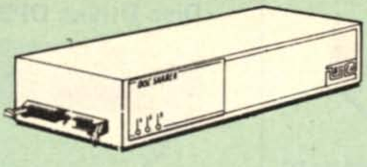
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17"X disc interface).

Launch Offer **£425** (Carr. £12)

Panasonic KX-P1083
Fast 240CPS (48CPS NLQ);
8K Buffer, Epson compatible, etc.
Launch Offer: £299

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£59** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

● *Complete Disc Interface Kit including DFS ROM and fitting instructions*	**£78**
● *Acorn's 0.90 DFS Kit complete*	**£79**
● *DFS Manual (Comprehensive)*	*(no VAT)* **£6.95**
(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).	
● *Watford's sophisticated DFS ROM only*	**£16**
● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only*	**£12**

● *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**

WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS as well.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

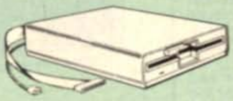
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

● Special introductory offer	**£39.00**
● DDFS Manual	(No VAT) **£6.95**
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

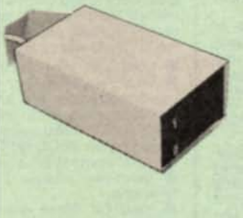
SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£130** (£6 carr)
(Offer valid while stocks last)



3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

● Single 400K Drive	**£69**
● Twin 800K Drives	**£126**

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

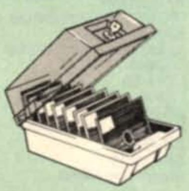
£6

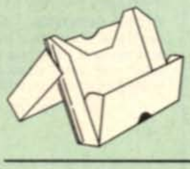
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** - holds upto 50 5¼" discs	**£6.00**
● **M85** – holds upto 95 5¼" discs	**£8.00**
● **M25*** – holds upto 25 3½" Discs	**£5.50**
● **M50** – holds 50 3½" Discs	**£7.50**

* Not lockable





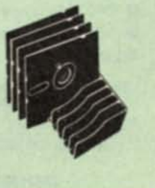
PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.



Protection at Only: **£2**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20**	Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95**	Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

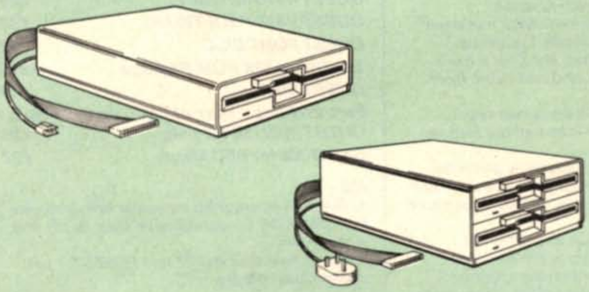
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £89	CLD 400 £168	CS 400S £99	CD400 £188
800K (1.44M)		CLD 800S £169		CD 800S £188

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes (744)*	***£8.00***
● *10 × 5¼" D/S D/D 40 Track Diskettes (745)*	***£9.75***
● *10 × 5¼" S/S D/D 80 Track Diskettes (746)*	***£12.50***
● *10 × 5¼" D/S D/D 80 Track Diskettes (747)*	***£12.75***
● *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT*	***£28***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£13.50***
● *10 × 3½" D/S D/D 40/80 track Discs*	***£15***
● *10 × 3½ High Density Diskettes*	***£43***

FREE

This extremely useful and attractive Personal Leather Organiser worth upto £50 is yours when you buy from us, 5 Boxes of any of the 3M range of Discs that we advertise above.

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box. We strongly recommend these Discs.

● *10 × **M3** 3½" D/S D/D 80 Track Discs*	***£15***
● *10 × **M4** 5¼" S/S D/D 40 Track Discs*	***£6.50***
● *10 × **M5** 5¼" D/S D/D 40 Track Discs*	***£8***
● *10 × **M7** 5¼" D/S D/D 80 Track Discs*	***£9***
● *3" Double Sided Discs*	***£3** each*

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

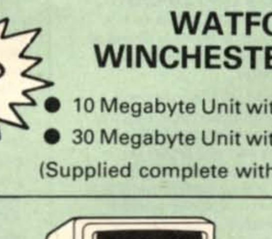
PRICES SLASHED

WATFORD's WINCHESTER DRIVES

● 10 Megabyte Unit with ADFS	**£375**
● 30 Megabyte Unit with ADFS	**£449**

(Supplied complete with utilities software)

CDP800S **CDPM800S**

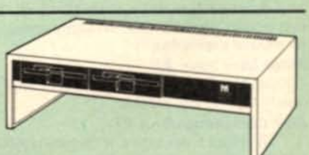


Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.
RRP £350

Our Price: Only £175
(carr £7)

Continued →

NOMINATED FOR
BRITISH MICRO COMPUTING AWARDS
1987

QUEST MOUSE

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87

"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87

". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package...:"

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."

"Quest Paint is a major leap forward in BBC programming. . ."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."

". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".

"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:

"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
ConQuest 32K ROM Package	***£29***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***
GXR ROM for BBC Micro	***£22***

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.

2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

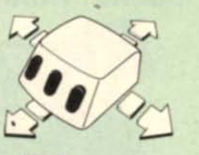
RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	**£59**
RB2 including Quest Paint	**£85**

FLEET STREET EDITOR

Software pack for BBC Micro	**£33**
Software pack for the Master	**£39**
Software Pack for Compact	**£40**
Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

THE NEW Mk III AMX MOUSE



ONLY: £59 **Inc. Super Art package**
(carr £1.50)
(Please specify for BBC, Master or Compact)

FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

AMX MAT	**£3**
AMX MOUSE ONLY	**£29**
AMX DESK Package	**£19**
AMX UTILITY Package	**£11**
AMX SUPERART Package	**£39**
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	**£32**

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	**£9.50**

AMX DESIGN (ROM)	**£59**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX XAM Educational	**£15**
AMX EXTRA EXTRA	**£19**
AMX MAX A gem of desktop (ROM)	**£15**

DIAGNOSTICS DISC

The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult.
At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

NEW

The WAPPING EDITOR

Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K ROM contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this section alone. This must surely be the ultimate in mouse-driven Mode 0 graphics.

WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

PAGE-LAYOUT SECTION

Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squashed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Paint may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint.
This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds Power to Beeb.

P.S. For details on Quest Paint and ConQuest, please refer to Page 7 of our advert.

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.
This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.
The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.
Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.
Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.
A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.
Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

Continued →

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

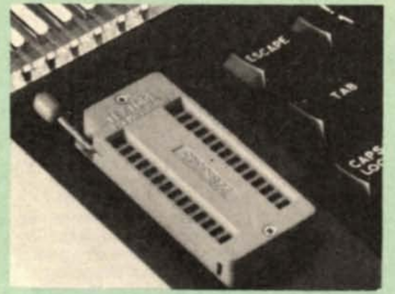
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

All prices in this advert are exclusive of VAT.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the Keyboard.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Twin £7.50; Quad £12

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

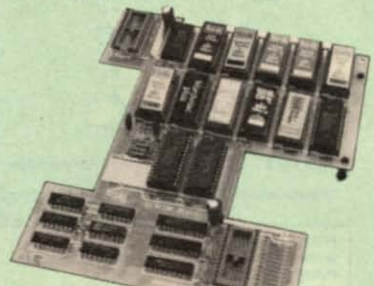
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

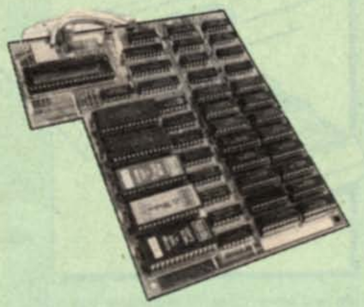
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£21** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£39***
- ROM/RAM card with 64k dynamic RAM ***£52***
- ROM/RAM card with a massive 128k dynamic RAM **£80**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£6**
- 16k Dynamic RAM for Upgrade **£7.50**
- Battery backup **£3**
- Read and Write protect switches .... **£2** each

Complete ROM-RAM board
All options installed **£89**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple "*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£88***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Minerva Systems Software

System Delta with Card Index	£55
System Programmers Ref. Guide	£19
System Gamma	£43
System Gamma Prog, Ref, Guide	£19
System Mailshot	£17
System Reporter	£17
System Intrer/View Link	£17
System Sales Ledger	£39
System Purchase Ledger	£39
System Nominal Ledger	£48
System Stock Management	£39
Order Processing/Invoicing	£39

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£88** **(Carr £3)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

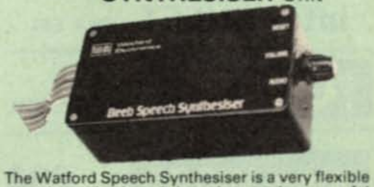
VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£12
Delta 3B Twin Joysticks	£17
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£28

Wordwise £24

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER-CHART ONLY: £26

Inter-WORD £38

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £82

INTERBASE £49

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	£48
VIEW PROFESSIONAL	£79
HI-VIEW (for use with 6502 2nd Processor)	£36
VIEW Printer Driver Generator (Please specify Disc or Cassette)	£9
VIEWSHEET (Acornsoft)	£37
VIEWSTORE	£39
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£22
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2 for the Master	£72

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29

MINI OFFICE II

DISC Version for BBC B & B+	£14.50
DISC Version for BBC Master	£17.50
ROM Version	£47.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

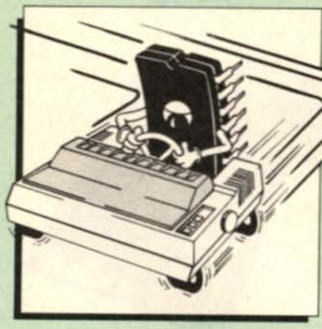
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

EPSON NLQ ROM
for the BBC Micro

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro ... it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles. **Only: £25**

BBC SOFTWARE'S
Popular Educational Software

● Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
● Maths with a Story 2 (Disc) 4 further maths programs	£11.25
● Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs	£17
● WAVES: Science Topics (Disc) CSC O Level Physics program.	£14.95
● RELATIONSHIP: Science (Disc) O Level Biology program.	£20.00
● BONDING: Science (Disc) O Level Chemistry program.	£20.00
● ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.	£20.00
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Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
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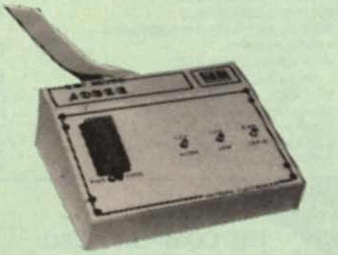
- NLQ Designer ROM, FONT Disc and Manual **£25**

(Write in for further details on all above ROMS)

ADDER



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32K

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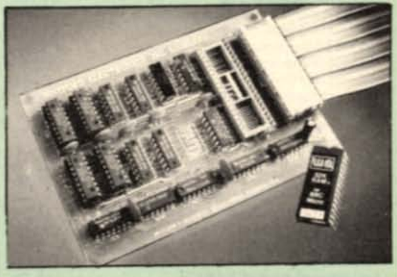
Expansion Board



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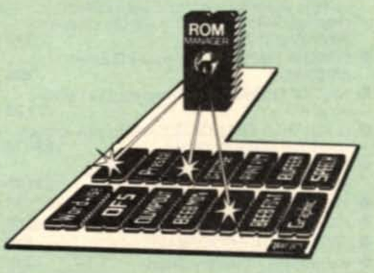

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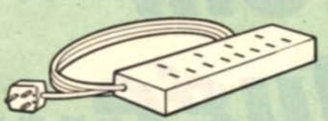

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THE BEEB
BODY
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COURSE

Data from the deluge...

Mike Cook continues building his electronic weather station by considering ways of measuring Britain's considerable rainfall

SUMMER is approaching and the birds are building nests inside my BBC Micro – the slot in the back makes it an ideal nesting box. I contemplate the sound of willow on leather and ponder the promised summer weather. So naturally my thoughts turn to rain, and how we can monitor it using our micro.

We have covered most of the components you need for a computerised weather station in the Body Build series so far – the wind speed in the anemometer article in June 1985, pressure in April 1986, wind direction in October, humidity in December 1986 and, finally, temperature in March 1987. So now let's turn our attention to that weather parameter so abundant in our climate – rain.

There are many methods of measuring this, and I want to outline some of them now. Traditionally the way has been to use a rain gauge – a funnel placed over a calibrated container that allows the amount of water collected to be assessed.

Now rainfall is measured in inches – or centimetres – but what that really means is cubic inches. A fall of one inch means that over an area of one square inch, rain has fallen to a depth of one inch.

In order to get a more accurate measure the rain is collected over a much larger area by the funnel and the rainfall calculated by dividing the measured depth by the area of the mouth of the funnel. The only snag with this is that someone has to take the reading each day and empty the gauge.

We could attempt to computerise this process by getting some method of electronically detecting the depth of water – to get a continuous reading would be far too difficult, but to detect a level is quite easy.

If we have two bare wires and allow them to come into contact with water, a current will flow and we can detect this and treat the presence of water just as if a switch had been closed. If we can detect this closure we can read if the water has reached the level of the wires.

This simple principle gave me the idea for the electronic dipstick. If we have several wires, reading which are closed and which are open gives us a measure of the water's depth. Now there is not enough electrical conduction through water to make the digital inputs of the computer respond directly, but there is sufficient to detect with the analogue input port.

If we arrange a resistor chain from the reference voltage to earth and have the rising water gradually short out the lower ones we can determine the depth of water by measuring the voltage at the first tap in the chain. The theoretical circuit for this is shown in Figure I.

As water is not a perfect conductor the practical arrangements require a little thought. We must arrange for the earth and the resistor node to have the minimum amount of water shorting it out: This is best achieved with a finger arrangement of printed circuit tracks.

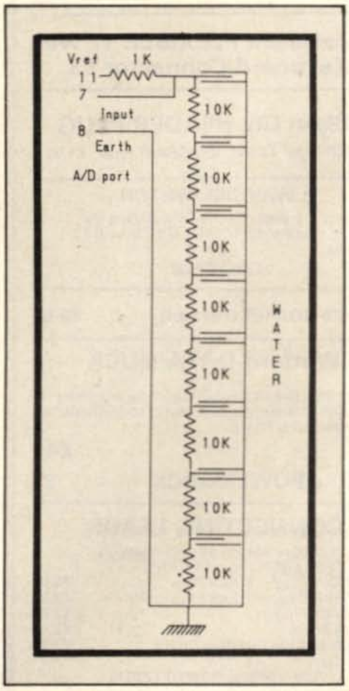

Figure I: Electronic dipstick

If you want to try this the printed circuit layout is shown in Figure II. The resistors should be coated in some waterproofing substance like silicon rubber. The type used for sealing round baths is ideal. Also, all the tracks except around the fingers should be protected with a layer of lacquer or nail varnish.

With this arrangement we can detect eight different levels. The printed circuit is laid out so that level differences of 0.5in are detectable. To read this simply use the statement:

```
L%=ADVAL(2) DIV 256
```

This will give a value in *L%* that is reasonably unaffected by stray pickup and you will need to calibrate it by seeing exactly what readings you get for each water level reached.

There are two main problems with the electronic dipstick approach. The first is that over the long term there will be corrosion of the tracks, and secondly if you leave the power on long enough electrolysis – the breaking down of water into its constituent parts of hydrogen and oxygen – will take place.

This happens whenever a current flows through water, and the result will be tiny bubbles of gas forming around the contacts. This effectively insulates the contacts and reduces the shorting effect.

We could take several steps to prevent this. The water could be agitated to remove the bubbles, the current could only be applied for a short time or alternating current could be used. Any would make the design more complicated and would not solve the problem of long term corrosion. So while the electronic dipstick would work for about four months without maintenance, it is not a perfect long term solution.

An alternative might be to have a pair of wires that are lowered into the water-measuring cylinder by a stepping motor. You could then count how many steps it took in order to register a contact, and thus very accurately gauge the depth of the water. However, with this, and the previous method, there is still the need to manually empty the measuring cylinder, and what we really need is one that automatically empties.

This can be achieved by using what is known as a tipping rain gauge – a technique used in professional automatic weather stations. The basic arrangement is a balance, and water is directed on to the light side to tip it over, as shown in Figure III.

The secret of making this work is to have the system as finely balanced as possible, but to have the centre of mass above the pivot. In this way the system never becomes balanced like a pair of scales, because this point is very unstable and it tips from side to side.

So all we have to do is to count the number of tips it has made and we have a measure of the rainfall.

While professional tipping rain gauges cost in the order of a £1,000 we can make a reasonably good one quite cheaply. I made mine out of some three quarter inch copper pipe with a centre section cut out using a file. I then flattened and soldered the centre to make the division between the two halves of the gauge,

As the tube was so big I had to use a blow lamp to do the soldering rather than a soldering iron but epoxy resin would have served equally well.

I made the pivot from a length of brass tube and rod of the type sold in model shops and mounted it on wooden blocks. I then installed the whole arrangement inside the lid of a powdered milk tin.

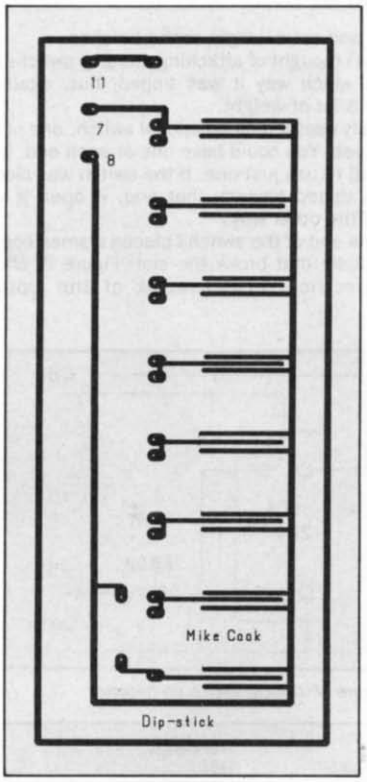

Figure II: PCB for the dipstick

> *All we have to do is count the number of tips*

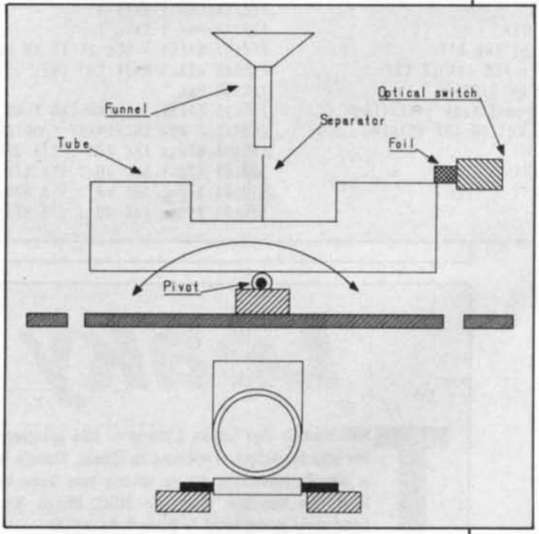

Figure III: Tipping rain gauge

The size of the mounting blocks determine the angle of tilt and so how much water can accumulate on one side. I cut holes out at each end to allow the tipped water to drain out and placed a large funnel over the top of the tin.

The tipping detector could be made in a number of ways. I first thought of placing magnets at each end and arranging a reed switch to be triggered by each tip. I rejected this because it

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◀ *From Page 115*

would add extra weight to the balance.

Then I thought of attaching mercury switches to detect which way it was tipped, but, again, it added a lot of weight.

Finally I settled on an optical switch, one of the slot types. You could have one at each end, but I decided to use just one. If the switch was closed it was tipped towards that end, if open it was tipped the other way.

At the end of the switch I placed a small copper foil paddle that broke the slot. Figure IV shows the electrical arrangement of the tipping detector. I carefully calibrated the device by seeing how many tips would be produced from an accurately measured amount of water.

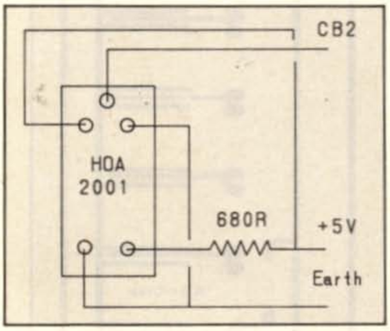

Figure IV: Optical switch tip detector

Due to inaccuracies in construction, the left and right tip were not quite equal so I averaged this out in the calibration.

Now, to run a program just to monitor the number of tips would be a little wasteful on computer time, so the listing below is a machine code background task to monitor the switch.

When a tip occurs an interrupt is generated on CB2 and this calls the interrupt service routine to count it in locations &7A through to &7D. It then swaps the edge sensitivity in the VIA to trigger the interrupt when the balance tips the other way.

This background task responds very rapidly, and if you are using any sort of mechanical switch in place of the optical ones you could get trouble with contact bounce causing false tips to be recorded. The simplest solution is to place a small capacitor across the switch.

The only snag with this arrangement is that the micro has to be on all the time to monitor the gauge. As it is a background task you can be doing other things with the micro, but it still has to be on all the time.

This is fine for something like a teletext file server on a network but is not suited to occasionally monitoring the weather. So next month we will look at a way to allow this tipping rain gauge to work on its own and take computer readings whenever we want to.

```
   10MODE4
   20PRINT"BEEB BODY BUILDING COURSE"
   30PRINT"TIPPING RAIN GAUGE"
   40PRINT"By Mike Cook"
   50!&7A=0 : REM CLEAR TIP COUNT
   60PROC_PATCH
   70REM SET UP VIA
   80?&FE6C=?&FE6C AND &1F
   90?&FE6E=&88 : REM ENABLE CB2
  100*KEY0 P.!&7A;" TIPS"|M
  110PRINT"Background task installed"
  120PRINT"PRESS KEY F0 FOR READING"
  130END
  140DEF PROC_PATCH
  150FOR PASS=0 TO 2 STEP 2
  160VECT=&7E
  170P%=&A00
  180[
  190OPT PASS
  200\ INTERRUPT SERVICE ROUTINE
  210PHA \ SAVE A
  220TXA:PHA \ SAVE X
  230TYA:PHA \ SAVE Y
  240LDA &FE6D \ SEE IF IT IS US
  250AND #&8 \ MASK OUT CB2
  260BEQ BLK
  270LDA &FE60 \ CLEAR IRQ FLAG
  280CLC \ NOW INCREMENT COUNTER
  290LDA &7A : ADC #01 : STA &7A
  300LDA &7B : ADC #0 : STA &7B
  310LDA &7C : ADC #0 : STA &7C
  320LDA &7D : ADC #0 : STA &7D
  330\ NOW TO TRIGGER ON OTHER EDGE
  340LDA &FE6C : EOR #&20 : STA &FE6C
  350LDA &FE60 \ CLEAR IRQ FLAG
  360.BLK PLA:TAY \RECOVER Y
  370PLA:TAX \RECOVER X
  380PLA \ RECOVER A
  390 JMP (VECT)
  400]
  410NEXT
  420IF ?&207=&A THEN 470
  430?VECT=?&206
  440?(VECT+1)=?&207
  450?&206=0
  460?&207=&A
  470ENDPROC
```

Leaky Listing

THIS month the Leaky Listing – the program for you to debug – returns to Basic. Here's is a simple guessing game where you have to find the number that the BBC Micro has randomly generated – from 1 to 1000.

There are four errors, one point of very bad programming and one omission that should be in any game of this type. In next month's issue of *The Micro User* you'll find the list of the errors, together with one or two hints for good programming.

We realise that there are better ways to write this simple program, so why not send your version to: *Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.* We'll pay £10 for the best one we publish.

```
   10 INPUT"How many guesses do you wa
nt";max
   20 high=1000
   30 guess=RND(high)
   40 I%=1
   50 REPEAT
   60 INPUT"What is your guess":yours
   70 IF guess>yours PRINT"TOO BIG"
   80 IF guess<yours PRINT"TOO SMALL"
   90 IF guess=yours GOTO 150
  100 I%=I%+1
  110 UNTIL I%=max
  120 PRINT"You've run out of guesses"
  130 PRINT"The answer was "Guess
  140 END
  150 PRINT"You got it!"
```

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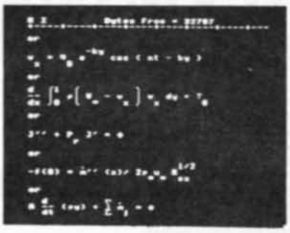

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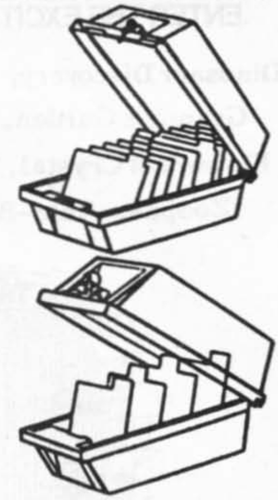

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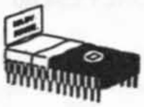

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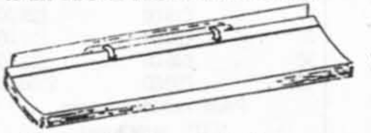

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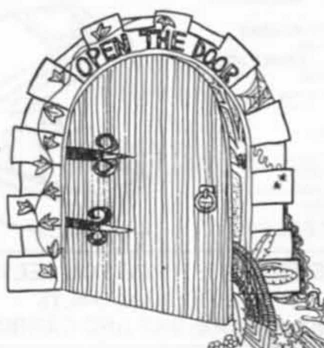

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Control those function keys

Robin Nixon concludes his series on adding extra commands to BBC Basic

THIS month we'll investigate adding a more powerful command to BBC Basic using the methods we've covered in the March and April articles. It is FLIST, which lists all of the function key definitions in a form that can be easily edited. But first let's have a brief look at how the function keys work.

The definitions – in the B and B+ – are stored in 256 bytes starting at &B00. The first 16 bytes point to the start of each key's definition, but as there is no pointer to the end of a definition, you must use the start of the next definition to get its length.

When defining function keys, codes less than 32 or greater than 126 must be represented by a control sequence. For example, if you want to enter the code for Return – CHR$13 – you have to type |M. The | stands for Control and M is the 13th letter of the alphabet.

If you want to enter code 129 you should type |!|A. Again | is Control and the ! – although it is CHR$33 – is treated as CHR$128. Finally the |A, which as Control+A is CHR$1, gives us CHR$129 when added to 128. However, if you typed |!A this would mean CHR$193, which is 128+65.

Now on to the coding. Line 1830 sets the Y register to zero. This is going to be used to count through each of the pointers to the start of the 16 function keys. Lines 1870 to 1910 set up the X register which also counts through the pointers.

Then lines 1950 to 1990 check whether the pointer indicated by X is higher than that referred to by Y. If so it has a chance of being the pointer to the next highest function key definition.

In this case the program branches to *greater* at line 3030 where it checks if it is less than the previous next highest number. If so its value is stored by *less* – lines 3090 to 3100.

Once we've tested all 16 pointers to find the next highest, lines 2060 and 2070 test whether location &8B still contains the value of &FF which we stored at lines 1890 and 1900. If so, this particular key definition is null and execution branches to *nodef* at line 2920 where the next definition is checked. But if the definition is not null *printloop* – lines 2160 to 2200 – prints *KEY.

If the function key number is less than 10 then, before printing it, *pdone* at lines 2240 to 2300 prints a preceding space. Otherwise lines 2340 to 2380 print the preceding 1 of any number greater than or equal to 10 then *single* – lines 2420 to 2470 – prints the last digit of the function key number.

Lines 2510 to 2590 then look at each character in the definition. If the Ascii value of the character is less than 32 the program branches to *toosmall* at line 2820. If it is greater than 126 the program branches to *toobig* at line 2710.

These two routines print a | if the value is less than 32 or a |! if it is greater than 126. If neither of these is true then the character is simply printed by *pbyte* at line 2630.

Having done this the program checks whether the whole definition has been printed at line 2650. If it has, the program jumps to *nodef*. If not, execution goes back to *pstring* where the next character goes through the various checks before being printed, and so on.

At line 2930 we check whether we've looked at all the definitions and if not, we go all the way back to *loop1* and repeat the whole process again on the next function key.

Otherwise, at line 2990 the program jumps to *osnewl*, which prints a carriage return and line feed. We jump straight to it rather than doing a JSR followed by an RTS because *osnewl* is an operating system subroutine which already has an RTS at the end.

Because we previously pushed the address of *quit* on to the stack at lines 1550 to 1580, the RTS returns us to *quit* where we tidily exit the program.

Well, that's it – for now anyway. If you come up with some useful extra commands, send them in and if there's room we'll publish the best ones.

```
  100 REM*****************
  110 REM*               *
  120 REM* FLIST SOURCE *
  130 REM* Function Key *
  140 REM*    Lister     *
  150 REM*  Robin Nixon *
  160 REM*               *
  170 REM* (c)MicroUser *
  180 REM*               *
  190 REM*****************
  200 REM
  210 MODE 7
  220 PROCinit
  230 FOR PASS=0 TO 3 STE
P3
  240 P%=&900
  250 [
  260 OPT PASS
  270 \
  280 .start
  290 \
  300 LDA basic
  310 CMP &8015
  320 BEQ vectors
```

```
  330 LDX #0
  340 \
  350 .errloop
  360 \
  370 LDA errmess,X
  380 BEQ enderr
  390 JSR oswrch
  400 INX
  410 JMP errloop
  420 \
  430 .errmess
  440 \
  450 OPT FNequs(CHR$13+C
HR$10+"This utility is fo
r Basic"+CHR$32)
  460 \
  470 .basic
  480 \
  490 OPT FNequb(B%+48)
  500 OPT FNequs(CHR$32+"
only!"+CHR$10+CHR$13+CHR$
```

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Dave's been down-under!

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```
0)
  510 \
  520 .enderr
  530 \
  540 RTS
  550 \
  560 .vectors
  570 \
  580 LDA &202
  590 LDX &203
  600 CMP #main MOD &100
  610 BNE changebrkvector
  620 CPX #main DIV &100
  630 BEQ alreadychanged
  640 \
  650 .changebrkvector
  660 \
  670 STA newbrk1
  680 STX newbrk2
  690 LDA #main MOD &100
  700 STA &202
  710 LDA #main DIV &100
  720 STA &203
  730 \
  740 .alreadychanged
  750 \
  760 RTS
  770 \
  780 .main
  790 \
  800 PHP
  810 PHA
  820 TYA
  830 PHA
  840 TXA
  850 PHA
  860 LDY #0
  870 LDA (&FD),Y
  880 CMP #4
  890 BEQ checkcommand
  900 \
  910 .notcommand
  920 \
  930 PLA
  940 TAX
  950 PLA
  960 TAY
  970 PLA
  980 PLP
  990 JMP (newbrk1)
 1000 \
 1010 .checkcommand
 1020 \
 1030 LDA &A
 1040 CLC
 1050 ADC &B
 1060 STA ptra1
 1070 LDA &C
 1080 ADC #0
 1090 STA ptra2
 1100 SEC
 1110 LDA ptra1
 1120 SBC #1
 1130 STA ptra1
 1140 LDA ptra2
 1150 SBC #0
 1160 STA ptra2
 1170 LDA #keytable MOD&1
00
 1180 STA keytab1
 1190 LDA #keytable DIV&1
00
 1200 STA keytab2
 1210 \
 1220 .comploop
 1230 \
 1240 LDY #0
```

```
 1250 \
 1260 .comploop1
 1270 \
 1280 LDA (keytab1),Y
 1290 BEQ found
 1300 CMP #58
 1310 BEQ notcommand
 1320 CMP (ptra1),Y
 1330 BNE next
 1340 INY
 1350 JMP comploop1
 1360 \
 1370 .next
 1380 \
 1390 JSR incmatch
 1400 BNE next
 1410 JSR incmatch
 1420 JSR incmatch
 1430 JSR incmatch
 1440 JMP comploop
 1450 \
 1460 .found
 1470 \
 1480 STY offset
 1490 INY
 1500 LDA (keytab1),Y
 1510 STA acadd1
 1520 INY
 1530 LDA (keytab1),Y
 1540 STA acadd2
 1550 LDA #(quit-1) DIV&1
00
 1560 PHA
 1570 LDA #(quit-1) MOD&1
00
 1580 PHA
 1590 JMP (acadd1)
 1600 \
 1610 .incmatch
 1620 \
 1630 LDA keytab1
 1640 CLC
 1650 ADC #1
 1660 STA keytab1
 1670 LDA keytab2
 1680 ADC #0
 1690 STA keytab2
 1700 LDY #0
 1710 LDA (keytab1),Y
 1720 RTS
 1730 \
 1740 .keytable
 1750 \
 1760 OPT FNequs("FLIST")
 1770 OPT FNequb(0)
 1780 OPT FNequw(flist)
 1790 OPT FNequb(58)
 1800 \
 1810 .flist
 1820 \
 1830 LDY #0
 1840 \
 1850 .loop1
 1860 \
 1870 LDA &B00,Y
 1880 STA &8A
 1890 LDA #&FF
 1900 STA &8B
 1910 LDX #0
 1920 \
 1930 .loop2
 1940 \
 1950 LDA &B00,X
 1960 CMP &8A
 1970 BCC notgreater
 1980 BEQ notgreater
 1990 JMP greater
 2000 \
 2010 .notgreater
```

```
 2020 \
 2030 INX
 2040 CPX #16
 2050 BNE loop2
 2060 LDA &8B
 2070 CMP #&FF
 2080 BEQ nodef
 2090 JSR osnewl
 2100 LDA #32
 2110 JSR oswrch
 2120 LDX #0
 2130 \
 2140 .printloop1
 2150 \
 2160 LDA keymess,X
 2170 BEQ pdone
 2180 JSR oswrch
 2190 INX
 2200 JMP printloop1
 2210 \
 2220 .pdone
 2230 \
 2240 TYA
 2250 CMP #10
 2260 BCS notsingle
 2270 LDA #32
 2280 JSR oswrch
 2290 TYA
 2300 JMP single
 2310 \
 2320 .notsingle
 2330 \
 2340 LDA #49
 2350 JSR oswrch
 2360 TYA
 2370 SEC
 2380 SBC #10
 2390 \
 2400 .single
 2410 \
 2420 CLC
 2430 ADC #48
 2440 JSR oswrch
 2450 LDA #32
 2460 JSR oswrch
 2470 LDX &8A
 2480 \
 2490 .pstring
 2500 \
 2510 LDA &B01,X
 2520 CMP #128
 2530 BCC smaller
 2540 JMP toobig
 2550 \
 2560 .smaller
 2570 \
 2580 CMP #32
 2590 BCC toosmall
 2600 \
 2610 .pbyte
 2620 \
```

```
 2630 JSR oswrch
 2640 INX
 2650 CPX &8B
 2660 BNE pstring
 2670 JMP nodef
 2680 \
 2690 .toobig
 2700 \
 2710 PHA
 2720 LDA #124
 2730 JSR oswrch
 2740 LDA #33
 2750 JSR oswrch
 2760 PLA
 2770 AND #&7F
 2780 JMP smaller
 2790 \
 2800 .toosmall
 2810 \
 2820 PHA
 2830 LDA #124
 2840 JSR oswrch
 2850 PLA
 2860 CLC
 2870 ADC #64
 2880 JMP pbyte
 2890 \
 2900 .nodef
 2910 \
 2920 INY
 2930 CPY #16
 2940 BEQ fquit
 2950 JMP loop1
 2960 \
 2970 .fquit
 2980 \
 2990 JMP osnewl
 3000 \
 3010 .greater
 3020 \
 3030 CMP &8B
 3040 BCC less
 3050 JMP notgreater
 3060 \
 3070 .less
 3080 \
 3090 STA &8B
 3100 JMP notgreater
 3110 \
 3120 .keymess
 3130 \
 3140 OPT FNequs("*KEY")
 3150 OPT FNequb(0)
 3160 \
 3170 .quit
 3180 \
 3190 DEC offset
 3200 LDA offset
 3210 CLC
```

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```
3220 ADC &A
3230 STA &A
3240 JSR checkend
3250 PLA
3260 PLA
3270 PLA
3280 PLA
3290 PLA
3300 PLA
3310 PLA
3320 PLA
3330 PLA
3340 JMP continue
3350 ]
3360 NEXT
3370 PRINTSPC1"*SAVE FLI
ST "STR$"start" "STR$"P%
3380 CALL &900
3390 END
3400 DEFPROCinit
3410 oswrch =&FFEE
3420 osbyte =&FFF4
3430 osnewl =&FFE7
3440 newbrk1=&70
3450 newbrk2=&71
3460 ptra1  =&80
3470 ptra2  =&81
3480 keytab1=&82
3490 keytab2=&83
3500 acadd1 =&84
3510 acadd2 =&85
3520 offset =&86
3530 B%=(?&8015)-48:IF B
%<1 OR B%>6 GOTO 3870 ELS
E ON B% GOTO 3570,3630,36
90,3750,3870,3810
3540 REM
3550 REM ** Basic 1
3560 REM
3570 checkend=&9810
3580 continue=&8B0C
3590 ENDPROC
3600 REM
3610 REM ** Basic 2
3620 REM
3630 checkend=&9857
3640 continue=&8B9B
3650 ENDPROC
3660 REM
3670 REM ** Hi Basic
3680 REM
3690 checkend=&D07C
3700 continue=&C398
3710 ENDPROC
3720 REM
3730 REM ** Master
3740 REM
3750 checkend=&9BA6
3760 continue=&9005
3770 ENDPROC
3780 REM
3790 REM ** Compact
3800 REM
3810 checkend=&9BA6
3820 continue=&8998
3830 ENDPROC
3840 REM
3850 REM ** Unknown
3860 REM
3870 CLS:PRINT"This Micr
o is not running a compat
ible  Basic":END
3880 DEFFNequs(string$)
3890 $P%=string$
3900 P%=P%+LEN(string$)
3910 =PASS
3920 DEFFNequb(byte)
3930 ?P%=byte
3940 P%=P%+1
3950 =PASS
3960 DEFFNequw(word)
3970 ?P%=word MOD &100
3980 P%?1=word DIV &100
3990 P%=P%+2
4000 =PASS
```

This listing is included in this month's tape & disc offer. See order form on Page 159.

Get it right!

```
 100 =    0 0   540 = 9843 B   980 = 4C9A 2  1420 = 52EE 7  1860 =    0 3  2300 = EF48 0  2740 = E621 7  3180 =    0 C  3620 =    0 A
 110 =    0 0   550 =    0 B   990 = FB1D 6  1430 = 52EE 8  1870 =  5BE 3  2310 =    0 0  2750 = 9224 8  3190 = DCF4 A  3630 = 999A C
 120 =    0 0   560 = 343B 3  1000 =    0 6  1440 = 5AFD 4  1880 = 28E8 4  2320 = 379D 3  2760 = 4E8A 7  3200 = F23A A  3640 = BA4C F
 130 =    0 0   570 =    0 3  1010 = 553B 0  1450 =    0 4  1890 = CBD5 E  2330 =    0 3  2770 = F060 C  3210 = 74FB 6  3650 = ED0F 7
 140 =    0 0   580 = 74DF D  1020 =    0 0  1460 = DB31 4  1900 = 188B 0  2340 = DEFC E  2780 = 6753 2  3220 = 30FD 8  3660 =    0 7
 150 =    0 0   590 = 3698 E  1030 = 93D6 F  1470 =    0 4  1910 = EA45 6  2350 = 9224 6  2790 =    0 2  3230 = 480B F  3670 =    0 7
 160 =    0 0   600 = 9253 D  1040 = 74FB D  1480 = 408D E  1920 =    0 6  2360 = 6ECC 0  2800 = 1434 A  3240 = 8BD6 0  3680 =    0 7
 170 =    0 0   610 = 54D2 7  1050 =   9E F  1490 = 6623 2  1930 =  372 5  2370 = 8D00 B  2810 =    0 A  3250 = 4E8A A  3690 = 13B9 1
 180 =    0 0   620 = AEF9 E  1060 = 88EC A  1500 = 2761 7  1940 =    0 5  2380 = C4D0 6  2820 = 824E 0  3260 = 4E8A 2  3700 = D6C3 A
 190 =    0 0   630 = F559 A  1070 = B394 4  1510 = 7C99 A  1950 = 159F 9  2390 =    0 6  2830 = 976E B  3270 = 4E8A B  3710 = ED0F 3
 200 =    0 0   640 =    0 A  1080 = A1BE 5  1520 = 6623 C  1960 = E3FE A  2400 = F195 2  2840 = 9224 A  3280 = 4E8A 8  3720 =    0 3
 210 = 1092 2   650 = C9FD 4  1090 = B88F 3  1530 = 2761 C  1970 = 48F3 D  2410 =    0 2  2850 = 4E8A 1  3290 = 4E8A 2  3730 =    0 3
 220 = DEBB 6   660 =    0 4  1100 = 8D00 4  1540 = 4CFA 8  1980 = F622 5  2420 = 74FB E  2860 = 74FB A  3300 = 4E8A E  3740 =    0 3
 230 = E856 F   670 = F990 5  1110 = 7EF2 D  1550 = AD5F F  1990 = 142B 8  2430 = 6054 9  2870 = C7BA D  3310 = 4E8A F  3750 = 52EF 0
 240 = C92F 3   680 = 58D1 F  1120 = EDDE A  1560 = 824E 7  2000 =    0 8  2440 = 9224 A  2880 = D851 D  3320 = 4E8A 9  3760 = CE78 1
 250 = EB9E 5   690 = DF66 8  1130 = 88EC 9  1570 = E9DC F  2010 = 8B5E 7  2450 = F600 A  2890 =    0 D  3330 = 4E8A 3  3770 = ED0F C
 260 = D5D8 8   700 = A7D2 C  1140 = 4E91 2  1580 = 824E 4  2020 =    0 7  2460 = 9224 9  2900 = 51F7 0  3340 = 3842 0  3780 =    0 C
 270 =    0 8   710 = 5426 0  1150 = FDFF 8  1590 = F5FC 4  2030 = 7602 1  2470 = 23D8 C  2910 =    0 0  3350 = 8B58 C  3790 =    0 C
 280 = 3208 1   720 = B7F3 6  1160 = B88F C  1600 =    0 4  2040 = EA0C D  2480 =    0 C  2920 = 6623 E  3360 = 2C83 0  3800 =    0 C
 290 =    0 1   730 =    0 6  1170 = B7F4 C  1610 = B08F F  2050 = D6E5 7  2490 = E067 9  2930 = 405D 6  3370 = A6F4 3  3810 = 52EF B
 300 = 5DE7 7   740 = 23C3 A  1180 = D30A A  1620 =    0 F  2060 = BF9D D  2500 =    0 9  2940 = 1CEF F  3380 = 59C4 7  3820 = 4D68 7
 310 = F45A F   750 =    0 A  1190 = F377 C  1630 = 9992 F  2070 = 66FF 4  2510 = 22AF 1  2950 = 49D0 5  3390 = FD2E 9  3830 = ED0F D
 320 = 1922 7   760 = 9843 E  1200 = E369 B  1640 = 74FB D  2080 = A472 B  2520 = FBC8 3  2960 =    0 5  3400 = 344C 3  3840 =    0 D
 330 = EA45 7   770 =    0 E  1210 =    0 B  1650 = B19F 0  2090 = 3334 E  2530 = 8293 5  2970 = E96A F  3410 = 24BA 5  3850 =    0 D
 340 =    0 7   780 = 37C9 2  1220 = 6051 F  1660 = D30A 5  2100 = F600 6  2540 = A87F D  2980 =    0 F  3420 = 8CD9 9  3860 =    0 D
 350 = 7C24 F   790 =    0 2  1230 =    0 F  1670 = A9F1 4  2110 = 9224 E  2550 =    0 D  2990 = 9C1B A  3430 = 1D85 3  3870 = CC8A 1
 360 =    0 F   800 = 805E 2  1240 = 9CF1 8  1680 = A1BE 0  2120 = EA45 8  2560 = 49AC F  3000 =    0 A  3440 = 7903 8  3880 = AF54 2
 370 = 9EB4 3   810 = 824E 0  1250 =    0 8  1690 = E369 1  2130 =    0 8  2570 =    0 F  3010 = 3AD4 2  3450 = 87F0 4  3890 = 4776 A
 380 = 7FFF F   820 = 6ECC 2  1260 = 1BD4 A  1700 = 9CF1 1  2140 = DB99 6  2580 = 9A00 A  3020 =    0 2  3460 = 29C7 9  3900 = C308 F
 390 = 9224 B   830 = 824E B  1270 =    0 A  1710 = 2761 6  2150 =    0 6  2590 = 4313 2  3030 = D39D B  3470 = E164 9  3910 = 4348 D
 400 = 7602 F   840 = 5DFD B  1280 = 2761 E  1720 = 9843 5  2160 = 5C40 D  2600 =    0 2  3040 = A5D9 C  3480 = A962 8  3920 = 54B0 A
 410 = 52DB C   850 = 824E F  1290 = 2EB4 6  1730 =    0 5  2170 = 6DF7 D  2610 = A290 C  3050 = 1566 9  3490 = 5791 4  3930 = 24A9 D
 420 =    0 C   860 = 9CF1 D  1300 = 91EC A  1740 = 74F6 4  2180 = 9224 7  2620 =    0 C  3060 =    0 9  3500 = 964B 3  3940 = 5569 5
 430 = BB2C 9   870 =  A93 3  1310 = 28A2 6  1750 =    0 4  2190 = 7602 8  2630 = 9224 1  3070 = B299 A  3510 = 488A C  3950 = 4348 7
 440 =    0 9   880 = 427D 0  1320 = B97D 3  1760 = 9274 F  2200 = 45A1 E  2640 = 7602 8  3080 =    0 A  3520 = FD74 6  3960 = 80CE 7
 450 = 29F8 0   890 = 9425 3  1330 = 8347 8  1770 = 65D9 5  2210 =    0 E  2650 = 8577 3  3090 = 188B 9  3530 = 9916 8  3970 = 8DBD 1
 460 =    0 0   900 =    0 3  1340 = 6623 B  1780 = FEF9 3  2220 = 9872 7  2660 = F9EB 0  3100 = 1566 2  3540 =    0 8  3980 = B3CD D
 470 = ABBD 2   910 = 55DE 4  1350 = 20CD 8  1790 = 8BFA 2  2230 =    0 7  2670 = 2B36 1  3110 =    0 2  3550 =    0 8  3990 = 650A A
 480 =    0 2   920 =    0 4  1360 =    0 8  1800 =    0 2  2240 = 6ECC F  2680 =    0 1  3120 = B79E C  3560 =    0 8  4000 = 4348 D
 490 = 5226 1   930 = 4E8A 6  1370 = F3EC 8  1810 = 11F1 8  2250 = DC20 9  2690 = B6A2 1  3130 =    0 C  3570 = 25B9 B
 500 = 9A59 D   940 = 670E 8  1380 =    0 8  1820 =    0 8  2260 = 6FB2 3  2700 =    0 1  3140 = 7A84 A  3580 = 10F5 0
 510 =    0 D   950 = 4E8A E  1390 = 52EE E  1830 = 9CF1 6  2270 = F600 B  2710 = 824E 4  3150 = 65D9 E  3590 = ED0F A
 520 = 4545 C   960 = 772F D  1400 = 8347 8  1840 =    0 6  2280 = 9224 D  2720 = 976E D  3160 =    0 E  3600 =    0 A
 530 =    0 C   970 = 4E8A 3  1410 = 52EE 7  1850 = 3311 3  2290 = 6ECC E  2730 = 9224 A  3170 = 4F84 C  3610 =    0 A
```

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THE CARE MASTER ROM CARTRIDGE RANGE

Designed by CARE Electronics to Acorns Specifications. High quality, robust cartridges that fit neatly into either of the Master Cartridge slots. Suitable for any ROM inc. Double Height ROMS ie Interword, Spellmaster etc.

	Price Ex VAT	Inc VAT
Care Standard Master Cartridge	@ £9.00	£10.35c
Care 1 x ZIF + 1 x STD SKT Cartridge	@ £13.40	£15.41c
Care 2 x ZIF Socket Cartridge	@ £17.60	£20.24c
Care Quad (4 x Sockets) Cartridge	@ £14.00	£16.10c
NEW Care 2 x 32k SKT Cartridge	@ £12.00	£13.80c
Master ROM Extender for BBC B Carts	@ £13.00	£14.95c

THE CARE BBC 'B' LOW PROFILE ROM CARTRIDGE SYSTEM

Care BBC Low Profile ROM System	@ £12.00	£13.80d
Care BBC ROM Cartridge	@ £3.00	£3.45c
Care BBC ZIF ROM Cartridge	@ £8.00	£9.20c
Care BBC ROM Cart Library Rack	@ £1.60	£1.84c

NEW THE CARE CONTROL-57 INTERFACE/CONTROL PCB

The Control-57 includes 48 programmable inputs or outputs and an 8 channel 8 bit Analog to Digital converter. The kit includes a PCB (excluding components) & full instructions. Please phone for details .... @ £50.00 £57.50d

THE CARE READY MADE LEAD RANGE

BBC/Master RGB – 6 Pin Microvitec RGB	@ £4.00	£4.60c
BBC/Master RGB – 7 Pin Hitachi RGB	@ £6.20	£7.13c
BBC/Master RGB – 7 Pin Ferguson RGB	@ £6.20	£7.13c
BBC/Master RGB – Euro (Scart)	@ £8.20	£9.43c
Archimedes – Euro (Scart) (not Sony)	@ £12.00	£13.80c
BBC Centronics Printer Lead 1.0m	@ £7.00	£8.05c
BBC Centronics Printer Lead 1.5m	@ £9.00	£10.35c
Archimedes Printer Lead	@ £12.00	£13.80c
NEW RM Nimbus Printer Lead	@ £12.00	£13.80c
Centronics – Centronics Printer Lead	@ £11.00	£12.65c
User Port Extension Lead 0.5m	@ £9.00	£10.35c
Printer Port Extension Lead 1.0m	@ £10.20	£11.73c
1MHz Bus Port Extension Lead 0.3m	@ £10.40	£11.96c
BBC/Master RS423 – RS232c	@ £12.00	£13.00c
BBC/Master RS423 – Archimedes RS423	@ £12.00	£13.80c
Disc Drive Data (Single)	@ £6.00	£6.90c
Disc Drive Data (Dual)	@ £8.00	£9.20c

SOFTWARE RANGE (Please Specify Disc Format Required)

Label Master Comprehensive Label Print	@ £15.00	£17.25d
Care Printer Buffer User Definable	@ £14.00	£16.10d
Inter-Word Word Processor	@ £47.80	£54.97d
Spell-Master Spell Checker	@ £50.00	£57.50d
Mastercopy DFS – ADFS ADFS – DFS	@ £11.26	£12.95c
Desfax Teletext Emulator	@ £20.87	£24.00c

MORLEY ELECTRONICS PRODUCTS

Teletext Adaptor & ATS ROM	@ £100.00	£115.00d
1Mb RAM Disc	@ £174.00	£200.10b
Master 'AA' ROM Board	@ £40.00	£46.00d
Eprom Programmer	@ £30.00	£34.50d
PSU for Teletext Adapter	@ £12.00	£13.80d

SWITCHING UNITS

BBC/Master 6 to 1 Printer Switcher	@ £71.00	£81.65d
Centronics 2 to 1 (inc Lead)	@ £30.00	£34.50d
Centronics 4 to 1 (inc Lead)	@ £70.00	£80.50d
Centronics 2 to 2 'X' Switcher	@ £70.00	£80.50d
Centronics 4 to 1 Automatic Switcher	@ £102.00	£117.30d
Centronics 8 to 1 Automatic Switcher	@ £128.00	£147.00d
User Port 2 way & Off Position (Lead)	@ £33.00	£37.95d
User Port 6 way & Off Position (Lead)	@ £72.00	£82.80d
BBC/Master RGB 2 to 1 Switch	@ £20.20	£23.23
BBC/Master RS423 2 to 1 Switch	@ £20.20	£23.23
Serial to Parallel Converter	@ £50.00	£57.50d
Parallel to Serial Converter	@ £50.00	£57.50d

PHILIPS MONITORS & TV MONITORS inc. lead

Suitable for Archimedes, Master & BBC computers

Philips 8833 Colour Monitor	@ £252.20	£290.03a
Philips AV7300 TV/Tuner for 8833	@ £65.00	£74.75b
Philips 1010 TV/Monitor Push Button	@ £228.00	£262.20a
Philips 1210 TV/Monitor Remote	@ £250.00	£287.50a
Philips Mono Monitors		P.O.A.

DISC DRIVE UNITS

3.5" & 5.25" Combined Unit inc. PSU	@ £190.00	£218.50a
3.5" Single Unit inc PSU	@ £100.00	£115.00b
3.5" Dual Unit inc. PSU	@ £170.00	£195.50a

GOVERNMENT & EDUCATION ORDERS WELCOME

HOW TO ORDER:

Enclose your cheque or P/Order made payable to CARE Electronics
ACCESS or VISA Credit Cards Welcome
Please allow 7 days for delivery
Please add carriage:
a = £10.35 b = £5.75 c = £1.15 d = £2.30

VISA

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE

17 Burnley Road, London NW10 1ED Tel: 01-208 1177 Fax: 01-452 1500
305 Edgware Road, London W2 Tel: 01-723 0233 Telex: 922800

ARCHIMEDES

300 & 400 SERIES

Archimedes 305 Basic	£699(a)
Archimedes 310 Basic	£775(a)
Archimedes 310M Basic	£835(a)
Archimedes 410 Basic	£1,399(a)
Archimedes 440 Basic	£2,299(a)
Monochrome Monitor*	£50(a)
PC Emulator Software (when purchased with computer)	£60(d)
Colour Monitor*	£195(a)

**Monitor prices applicable only when purchased with the micro.*

ADD-ONS

0.5Mb Ram upgrade kit (for 305)	£79(c)
2nd Floppy drive (for 305, 310 & 410)	£125(b)
Econet Module (with stn set disc)	£43(c)
Backplane for 2 podules	£39(b)
I/O Podule	£79(b)
20Mb Hard Disc + Podule	£499(a)
Acorn Rom podule	£59(c)
CC Rom Podule	£49(d)
Acorn Midi I/O card	£29(c)

More podules are expected in the coming weeks please telephone for latest updates

IEEE Interface Podule	£283(b)

Full implementation of IEEE std 488 1978 & supp. IEEE std 488A 1980. Full specification on request.

SERIAL LINKS

Arc. to BBC Serial Link (Software for both Arc & BBC)	£25(c)
Arc. to PC/XT (Software for both Arc & PC)	£29(c)
Arc External Drive Adaptor	£25(d)

BOOKS: *(no VAT)*

Arc. Ref Manual	£29(b)
ARM Assy Lang Prog	£12(d)

SOFTWARE:

PC Emulator	£99(d)

LANGUAGES:

ANSI C	£95(c)	ISO PASCAL	£95(c)
Prolog X	£199(b)	FORTRAN 77	£95(c)
LISP	£199(b)	COMAL	POA

PROGRAMMERS TOOLS:

TWIN *Editor*	£29(d)
Arc. Toolkit Module	£33(d)
Software Dev T/Box	POA
Software Dev Debug T/box	POA

PRODUCTIVITY TOOLS:

Logistix (incl Spreadsheet, timesheet, d/base & Graphics)	£95(c)

WORDPROCESSORS

First Word	£POA
Graphics Writer	£29(d)
View SKM31 (e)	£49(d)
InterWord (e)	£39(d)

DATABASES

Deltabase	£26(d)
Systems DeltaPlus	£60(d)
Alphabase	£41(d)
Viewstore SKM27 (e)	£52(d)

SPREADSHEET

Viewsheet SKM07 (e)	£52(d)
Intersheet (e)	£39(d)

GRAPHICS & ART

Gammaplot	£30(d)
System Gammaplus	£60(c)
Artisan	£32(d)
Interchart (e)	£25(d)

Special Offer

FREE £115 inc vat VOUCHER

with every Archimedes model 310, 410 and 440 purchased from us. This voucher can be redeemed against any future purchase made from us. Additionally we will offer discounts upto 10% on Archimedes software and upto 5% on Archimedes hardware stocked by us to all purchasers of Archimedes computers. This is a limited period offer so do not miss your opportunity for a bargain not to be repeated.

ACCOUNTING SOFTWARE

Minerva's suite 5 Modules (ea)	£54(d)

Order Processing, SalesLedger, StockManager, Purchase Ledger & Nominal Ledger

GAMES:

ZARCH	£17(d)
Minotaur	£11(d)

Software packages marked with (e) run under 6502 emulated mode.

Please check on availability of some of the above packages

FILE STORE

Acorn's new file server system

Filestore E01	£825(a)
Filestore E02	£699(a)

Full details on request

ECONET ACCESSORIES

Econet Starter Kit	£85(b)	Econet Bridge	£174(b)
Econet Socket Set	£29(c)	Printer Server Rom	£41(d)
File Server Level II	£75(b)	10 Station Lead Set	£26(d)
Master FS Utility Disc	£17.25(d)		

ECOLINK

Ecolink allows you to connect a PC/XT or AT to an econet network. Supplied complete with comprehensive manual, software and cable.

Full spec on request	£299(b)

UPGRADE KITS

1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£43.50(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

EPROMS/RAMS

2764-25
27128-25 (12.5V Vpp)
27128-25 (21.0V Vpp)
6264LP-15
27256
27512

All prices on application

MASTER SERIES

AMB15 Master 128K	£356(a)

Includes *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.

AMC06 Turbo 65C102 Module	£95(b)
ADC08 512 processor	£185(b)

ADF10 Econet Module	£40(c)	Acorn Rom Cartridge	£13(d)
ADJ22 Ref Manual I	£14(c)	ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)	V/sheet User Guide	£8.50(d)
TRC2 2ROM Cartridge	£7.50(d)	TRC4 4ROM Cartridge	£11(d)
TRC32 32K RAM Cart.	£29(d)	Master Dust Cover	£4.75(d)

Acorn 32016 Co Processor	£949(a)
Acorn X25 Gateway	£2175(a)
Acorn IEEE Interface	£265(b)
Universal CoProc Adapter (incl DOS+ & GEM suite)	£69(b)

Send for detailed list of DOS software for 512

MASTER COMPACT

All Compact systems come complete with 128K of RAM, 640K 3.5" double sided drive and educational software. Additionally we include our Education/Fun software bundle to the package.

SYSTEM 1 Entry system	£310(a)
SYSTEM 2 with 12" Hi Res Mono Monitor	£365 (2xa)
SYSTEM 3 with 14" Med Res Col Monitor	£475 (2xa)

Compact 2nd Drive Kit	£95(c)
Serial Kit	£25(d)
TV Modulator	£26(c)
Mertec Adapter (upgrades Compact to almost Master level)	£35(c)
External Drive adapter Cable	£9(d)

Z88 PORTABLE MICRO

A lightweight compact micro that can be carried in a brief case. Software available for transferring data to BBC and PC systems.

Z88 Micro c/w rechargeable batteries	£239(a)
Mains Adaptor	£8.65(d)
NiCad Rechargeable Battery	£2(d)
32K RAM or Eprom Pack	£17.35(d)
128K Ram or Eprom Pack	£43.40(d)
Z88 BBC Link with software	£21.70(d)
Parallel Printer Cable	£24(d)
Serial Printer Cable	£8.65(d)

SANYO CRT 70

14" Hi Resolution RGB Monitor

£209

RRP £429 12 months Warranty

CANON PW1080 Printer

£199(a)

12 months Warranty

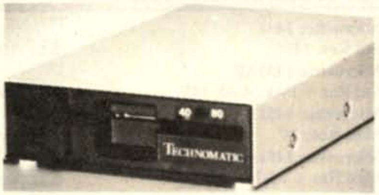
RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2*8K RAMS	£37(c)
ATPL Battery backup kit	£18(d)
ATPL Board for BBC+	£31(c)

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

TECHNOMATIC DISC DRIVES



TS 400

PD 800P

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.

5.25" Single Drives 40/80 switchable:	
TS400 400K/640K	**£90(b)**
PS400 400K/640K with integral mains power supply	**£104(b)**
5.25" Dual Drives 40/80 switchable:	
TD800 800K/1280K	**£170(a)**
PD800 800K/1280K with integral mains power supply	**£190(a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£209(a)**
3.5" 80T DS Drives:	
TS351 single 400K/640K	**£67(b)**
PS351 single 400K/640K with integral mains power supply	**£85(b)**
TD352 Dual 800K/1280K	**£126(b)**
PD352 Dual 800K/1280K with integral mains power supply	**£149(b)**
Combo Drives (5.25" & 3.5" drives)	
PD853 with integral psu	**£165(a)**
PD853P with integral psu	**£179(a)**

DISC DRIVE MULTIPLEXER
see page 5 of this ad for details
For Master, B, B+ and any DFS/ADFS

TDM2 Two computers/one drive unit	**£65(b)**
TDM4 Four computers/one drive unit	**£115(b)**

TECHNOMATIC WINCHESTERS

Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Larger capacity drives available on request.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive	**£429(a)**
P30HD 30Mb Winchester Drive	**£449(a)**
P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	**£749(a)**
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	**£609(a)**
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	**£1179(a)**
TS10 10 Mbyte Tape Streamer Backup unit with utilities.	**£599(a)**
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	**£19(d)**

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering otherwise the drive has to be returned to us for modification.

Adaptor for SJ FileServer	**£28**

WINCHESTER Drive Multiplexer

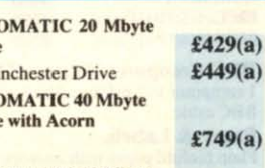
These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers.	**£99 (b)**
TWM4 for four Computers.	**£149 (b)**

NEW

Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master. **£449(a)**

3M FLOPPY DISCS



5.25" Discs in packs of 10	
744 40T SS DD	**£8.00(d)**
745 40T DS DD	**£9.75(d)**
746 80T SS DD	**£12.00(d)**
747 80T DS DD	**£12.75(d)**

3.5" Discs in packs of 10	
80T SS DD	**£13.50(d)**
80T DS DD	**£15.00(d)**

(Add £1 for library case packing)

***FREE* Leatherbound Personal Organiser**
with every 50 3M discs

BULK DISCS

50 5.25" 40 T single sided discs with sleeves in lockable box.	**£25(b)**
50 5.25" 80 T double sided discs with sleeves in lockable box.	**£32(b)**
50 3.5" 80T double sided discs with sleeves in lockable box.	**£60(b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	**£14.00(d)**
3.5" Kit with 20 disposable discs	**£14.75(d)**

DISC STORAGE BOXES

DB340 Lockable 40 × 3.5"	**£8.50(c)**
DB550 Lockable 50 × 5.25"	**£6.50(c)**
DB570 Lockable 70 × 5.25"	**£8.50(c)**
DB5100 Lockable 100 × 5.25"	**£10.50(c)**

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON FX800	£295(a)
EPSON FX1000 £405(a) **EPSON EX800**	£395(a)
EPSON EX1000	£539(a)
EPSON LQ1050	£529(a)
EPSON GQ3500 Laser Printer	£1290(a)
TAXAN KP815 £249(a) **TAXAN KP915**	£350(a)
NATIONAL PANASONIC KXP1081	£149(a)
NATIONAL PANASONIC KXP1082*	£175(a)
STAR LC10	£209(a)
INTEGREX Multicolour Inkjet printer	£519(a)
BROTHER HR20	£349(a)
NAT PANASONIC KX P3131 includes massive buffer of 38K	£249(a)
JUKI 6100 Daisy wheel printer	£295(a)
BBC/Master Parallel Lead (1.2m)	£5(d)
BBC/Master Parallel Lead (2m)	£7(d)
Compact Parallel Printer Lead (1.2m)	£9(d)
Archimedes Parallel Printer Lead (2m)	£9(d)

***** Price includes Free Master printer lead and WYSIWYG + ROM***

EPSON LX800

Epson's latest budget printer offers a host of new features all utilising Epson's unrivalled knowhow of printer technology and reliability.

★ 180 cps draft/25cps NLQ ★ two modern fonts as std: Sans Serif and ROMAN. NLQ font selection from front panel ★ Tractor and friction feed ★ Single sheet guide with auto load switch. Original + 2 copies.

★ 3K input buffer with character downloading facility

★ Fully compatible with BBC & IBM graphics

★ Centronics interface as standard

★ Price including BBC master lead **£179(a)**

EPSON LQ500

Epson's budget 24pin letter quality printer provides unrivalled print quality with two built in letter quality fonts and widest repertoire of type styles at low cost. Sans Serif and Roman or draft font can be selected from the front panel as can print speeds with max resolution of 360×180 dpi. Friction and tractor as standard. Parallel interface. Designed for low noise operation 55dB(A).

Introductory price incl. master lead **£329(a)**

EPSON LQ850

Epson's latest 24pin letter quality printer has been specifically designed for optimum paper handling convenience. Both single sheets and fanfold paper can be loaded simultaneously and a single lever enables the selection of either for printing. Micro adjust feature enables paper feed forward or reverse in increments as fine as 1/180" – ideal for form setting. Auto load of selected paper to printing position. Very fast printing speeds 264cps draft & 88cps LQ. Sans Serif & Roman LQ fonts can be selected from front panel as can the character pitch.

LQ850 has been specially insulated to keep the noise level down to 55db(A). Parallel & Serial interface as std.

Introductory Price including BBC Master lead **£419(a)**

MODEMS

MIRACLE WS4000 V21/23	£135(b)
MIRACLE WS3000 V21/23	£244(b)
MIRACLE WS3000 V22	£409(b)
MIRACLE WS3000 V22 bis	£537(b)
(All modems are BABT approved)	
BBC Data Cable for WS3000/4000	£10(d)
MIRACLE WS2000V21/23 & BELL stds	£92(c)

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL	£465(a)
Plotmate A4S	£420(a)
Plotmate A3M	£640(a)
Roland 880 A3 Flat bed 8 col	£599(a)

Variety of Plotter pens and accessories in stock.

Larger Plotters available. Please enquire.

PRINTER SHARERS & BUFFERS

TSB256 Printer Sharer Buffer

Provides a massive buffer size of 256K and connects three computers to one printer. Autoswitching between computers. Facility to print copies. **£189(b)**

BUFFALO PB Buffer

Parallel buffer for internal fitting to most Epson printers. Simple to instal.

PB128 (128K) **£89(c)**

PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases, all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£25(c)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(c)	25v25-4	£45(c)
2 Computers 2 Printers		25v25-x	£49(c)
X-over 36v37-x	£49(c)		
BBC Cable Set 3 to 1 (1m ea)	£24(c)		
BBC Cable Set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels

Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12 (£3.50)
2000 sheets 14½ × 11"	£18.50 (£4.50)
1500 sheets A4 90gsm	£18.00 (£4.00)

Labels/1000

Single Row 3½ × 1⁷⁄₁₆	£5(d)
Triple Row 2⁷⁄₁₆ × 1⁷⁄₁₆	£5(d)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**

PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B+ and Master

EpromRyter (Epromer II) EpromRyter is compatible with BBC Master only. See page 7.	£89(b)
EPROMER II	£89(b)
META ASSEMBLER	£145(b)
PORTAL EPROM EMULATOR 512K	£245(b)
TEAM Disassembler	£145(b)
EPROM ERASERS	
UV1B 6 eproms, safety cutout	£47(b)
UV1T 6 eproms, timer, safety cutout	£59(b)

MONITORS

All Monitors supplied with a suitable lead.

12", 14" and 20" MONITORS

Microvitec 1431 Std Res, 14"	£179(a)
Microvitec 1431AP Std Res + PAL/Aud, 14"	£199(a)
Microvitec 1451 Med Res, 14"	£225(a)
Microvitec 1451AP Med Res + PAL/Aud, 14"	£255(a)
Microvitec 1441 Hi Res, 14"	£359(a)
Philips 14" RGB Med Res, 14", high contract screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Separate controls for brilliance and contrast. This is the monitor used by Acorn with Archimedes and Compact Computers.	£195(a)
Sanyo CRT 70 14" High Resolution Monitor	£209(a)

Resolution better than Microvitec 1441, suitable for Master, Archimedes.

Microvitec 2030CS 20" Standard Resolution RGB/Comp Video	£380(a)
Microvitec 2040CS 20" High Resolution RGB/Comp Video	£675(a)
TAXAN SUPER VISION 620 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£269(a)
TAXAN SUPER VISION 625 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£319(a)
TAXAN 770+ MultiSysnc Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand	£499(a)
NEC MultiSync II 14" Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles.	£489(a)

12" MONOCHROME MONITORS

PHILIPS BM 7502 Hi Res green screen	£69(a)
PHILIPS BM7522 Hi Res amber screen	£75(a)

TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program **£29(d)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17(c)
Monitor Stand Models B & B+	£10(c)
Monitor Stand Master	£13(c)
Double Tier Stand Models B, B+ or Master	£24(b)
Taxan RGB Lead	£7(d)
Microvitec Lead	£4(d)
Monochrome BNC/Phono Lead	£4(d)

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£49 (d)
TM Version plus Tracker Ball	£94 (d)
TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)
MOUSE **AMX MOUSE with SUPER ART** (pse specify B, B+ or Master)	£59 (d)
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WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B	6502 Second Processor,	BBC Master 128	All printers (Except lasers)
BBC Model B+	Turbo coprocessor	BBC Compact	

WYSIWYG PLUS workspace is relocatable.

MAYA TERMINAL EMULATOR

A comms package for the professional user. MAYA emulates DEC VT52, VT100 and Tandberg TDV2215. Special BBC VDU mode allows full access to the BBC VDU driver.

Menu driven software allows the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master, Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems.

BLACK QUEEN

A contract bridge program from BBC Publications both for beginners and for club players. Features include rebid and/or reply of any deal just played. Deals can be saved to a disc. Unique feature of Black Queen is its ability to construct deals from standard or classic ones in newspapers etc.

Compatible with Master, B and B+ **£13(d)**

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover		Drawstick
Wordplay	Pantry Antics	Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc	**£17.50(d)**
3.5" Disc	**£18.50(d)**

(Normal RRP over £40)

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to...

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d) instead of the usual £15. Offer valid while stocks last.

BISMARCK

An enthralling game of strategy involving the famous German battleship of the same name.

You can play the role of British Navy in its quest to find the Bismarck and sink it or take either British or German role against another player. It requires the highest qualities of judgement, observation and decision to plan strategy and tactics to plot the death of Bismarck. **£13(d)**

PRINTER ACCESSORIES

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Novacad can drive a plotter to produce drawings of highest quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use. **Beebug Dec 86**

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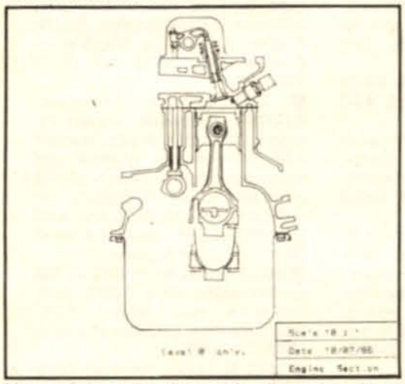

Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

- ★ Simple and easy to use with logical command sequence.
- ★ A large drawing area (approx 15 screens)
- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
- ★ Zoom facility.
- ★ Create multi level drawings.
- ★ Text entry at any 90° orientation anywhere on the screen.
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers
- ★ Cursor control from keyboard/tracker ball/mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC coompatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximumm plotter size.

NOVACAD T/M Version	**£49(d)**
NOVACAD T/M + Plotter DG	**£61(c)**
Plotter Driver Generator	**£15(d)**

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EpromRyter

***Highly sophisticated & Advanced Programmer**
***All current single rail eproms handled**
***State of the Art Programming Algorithms**

EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

META Version III

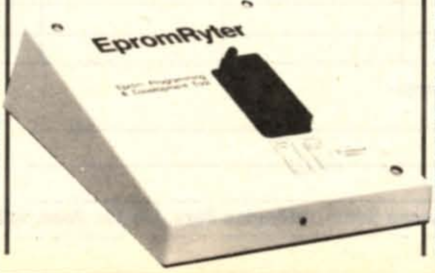
"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach." **Acorn User October 1986**

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc – and 68000 – using native mnemonics for each processor, eg LD A, (HL) for Z80 and MOV A0, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassembler.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc – all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF suppression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-bound manual, function-key strip.

The single rail eproms handled by the EpromRyter are:

- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

£89(b) + VAT



EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request. **£89(b)**

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second – No "erase" time.
- 28 pin header plugs into Eprom socket on target system – status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-port cable.
- Complete with all cables, manual and disc.

PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

TEAM DISASSEMBLER

The third part of the Universal Development System: a Meta labelling disassembler.

Supports 1802, 8080, 8085, #HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etcc, tables. These areas disassembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/repalce for re-naming arbitrary label names with meaningful ones.

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- Torch ZEP100 Z80 processor perfect suite Wordstar £95. View 2.1 £20. Tel: 01 949 6817.
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- Model B o.s.1.2 basic 2 as new. Offers. Large range of books, cassette software and numerous magazines - A&B, Acorn User and Micro User back to issue 1 phone for list. Tel: 021 308 1354.
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- For sale Master 128 £300 o.n.o. Acorn Teletext £75. Morley Teletext £75. MX80 printer £70. Zenith b&w monitor £60. 512 processor £200. Ds dd + psu drive £80. Tel: 0603 812338.
- Amx Pagemaker £30. Amx mouse and paintpot £30. Masterfile II £12. Viewstore £25. Viewsheet wanted. Tel: 0736 63918.
- Prism modem 2000 with software and information £25. Tel: 0274 637482 ask for Paul.
- Pace 40T s/s 5.25 disc drive £50. Tel: Congleton 277141.
- Boxed Gxr rom/book for BBC micro £13.50. Micro User, Acorn User magazines 84-87 offers! Tel: 01 579 0607.
- Watford DDFS - all complete except for 74LSR3 chip (needed for my 1770 interface) includes manual and fitting instructions OS 1.53 approx 6 months old £35 o.n.o. Tel: 0293 545620 (Paul).
- First four volumes (48 issues) The Micro User in official binders, excellent condition. Will sell lot only £30 buyer collects. Tel: Southport (0704) 25186.
- Micro User Library Feb 84 to Mar 88 offers. Tel: 061 430 4598.
- Osbourne portable computer (64k). DDFS, twin disc drives, software and manuals included. Bargain at only £100. Tel: Trevor (0406) 380621.
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B B+

Directory kill

Tidy up your ADFS discs the easy way with Darren Dickens' great utility

DELETING directories can be annoying when the *Dir not empty* error keeps coming up. Removing individual directories, subdirectories and files can be a very time-consuming job. So here's a directory killer to make life easier.

Just type it in, make sure you've made no typing errors using Get it Right!, then save the program as anything except DirKill, which is the name the machine code routine is saved as. It is called by entering:

```
*DirKill <pathname>
```

Examples of the types of calls you would use are:

```
*DirKill @
*DirKill ^.L*.B*.MicroUser
*DirKill Let*.Busi*.Mic*
*DirKill $
*DirKill
```

The last two are equivalent and will erase everything on the disc once you have satisfied the checking prompt. When called, the program first checks that the ADFS pathname is not too long to store. The last name specified in the call is the directory which is to be removed: If it contains any files they are unlocked and deleted. Subdirectories are entered and removed in the same fashion.

It is theoretically possible for the program to quit before it has truly finished if it has to go down 256 directory levels. If this does happen it will have deleted the lowest 256 levels and then stopped, so re-issuing the command will kill the next lowest 256 levels. However, this situation should never arise in reality.

The program is not re-entrant as it has been highly optimised and so is not suitable to include in sideways ram as a utility. If this was needed the program could be expanded to its proper form without the tricks.

There are no fast, illegal optimisations and the program will work on any BBC Micro that uses ADFS. On the Master and Compact there is a section of memory known as the transient utility workspace – at &DD00 – and DirKill operates in this region, so preserving all user areas.

The program must be assembled at &900 for the BBC B and B+ but it works equally well.

```
   10 REM Directory Killer 6.20
   20 REM For all BBC Micros with ADFS
   30 REM (except Archimedes!)
   40 REM Written by D. Dickens
   50 REM (c) The Micro User
   60 REM ----------------------------
   70 B%=&DD00:REM &900 on B, B+
   80 FileLength=52:ZeroPage=&70
   90 Blank$=STRING$(FileLength,"x")
  100 osgbpb=&FFD1:osargs=&FFDA
  110 osfile=&FFDD:osrdch=&FFE0
  120 oswrch=&FFEE:osasci=&FFE3
  130 osnewl=&FFE7:oscli=&FFF7
  140 FOR I%=0 TO 2 STEP 2
  150 P%=B%:[OPT I%
  160  LDA #0:TAY:JSR osargs
  170  CMP #8:BEQ Adfs
  180  BRK:OPT FNequB(145)
  190  OPT FNequS("Not ADFS"):BRK
  200 .Adfs:LDX #3
  210 .SaveLoop:LDA ZeroPage,X
  220  STA Spare,X:DEX:BPL SaveLoop
  230  LDA #1:LDX #ZeroPage:LDY #0
  240  JSR osargs:LDX #0
  250 .MoveLoop:LDA (ZeroPage),Y
  260  STA DirName,X:CMP #13
  270  BEQ GotName:INX:INY
  280  CPY #FileLength+1:BNE MoveLoop
  290  JSR Restore
  300  BRK:OPT FNequB(144)
  310  OPT FNequS("Path longer than "+ST
R$(FileLength)+" chars"):BRK
  320 .GotName:LDA #1:STA ZeroPage
  330  JSR RunCommand:LDA #6
  340  JSR ReadBlock:LDY #9
  350 .StoreLoop:LDA Text+3,Y
  360  STA KilledDir,Y:DEY
  370  BPL StoreLoop:CMP #36
  380  BNE Start:LDY #17
  390 .AreYouSureLoop
  400  LDA AreYouSure,Y:JSR osasci
  410  DEY:BPL AreYouSureLoop
  420  JSR osrdch:BCS Abort:JSR oswrch
  430  AND #&5F:CMP #89:BNE Abort
  440  JSR osnewl
  450 .Start:LDA #13:STA Text+11
  460 .DirLoopStart:INC Block+5
  470  JSR ReadFileName:LDA Block+5
  480  BNE UpDir:LDA #5
  490  LDX #Block2 MOD 256
  500  LDY #Block2 DIV 256
  510  JSR osfile:CMP #2
  520  BNE DeleteFile:INC ZeroPage
  530  LDA #(Text+1) MOD 256
  540  LDX #Dir MOD 256
  550  JSR DoCommand:JMP DirLoopStart
  560 .Abort:JSR Restore:BRK
  570  OPT FNequB(146)
  580  OPT FNequS("Aborted"):BRK
  590 .UpDir:LDX #Dir MOD 256
  600  LDY #Dir DIV 256:JSR oscli
  610  JSR ReadFileName:DEC ZeroPage
  620  BEQ Exit
  630 .DeleteFile:LDA #(Text+1)MOD256
  640  JSR DeleteFileName
  650  JMP DirLoopStart
  660 .Exit:JSR Restore:LDA KilledDir
  670  CMP #36:BEQ Return
  680  LDA #KilledDir MOD 256
  690  JSR DeleteFileName
  700 .Return:JMP osnewl
  710 .DoCommand:STA CommandLoop+7
  720  STX CommandLoop+1:LDY #9
  730 .CommandLoop
  740  LDA DirName,Y:STA Command,Y
  750  LDA DirName,Y:STA DirName,Y
  760  DEY:BPL CommandLoop
  770  LDA #13:STA DirName+10
  780 .RunCommand:LDX #Command MOD256
  790  LDY #Command DIV256:JMP oscli
  800 .DeleteFileName:PHA
  810  LDX #Access MOD 256
  820  JSR DoCommand:PLA:PHA
  830  LDX #Delete MOD 256
  840  JSR DoCommand
  850  JSR PrintDeleting
  860  PLA:STA PrintNameLoop+1:LDY #0
  870 .PrintNameLoop:LDA Text+1,Y
  880  JSR oswrch:INY:CPY #10
  890  BNE PrintNameLoop:RTS
  900 .PrintDeleting:LDY #8
  910 .DeletingLoop:LDA KillString,Y
  920  JSR oswrch:DEY
  930  BPL DeletingLoop:RTS
  940 .ReadFileName:LDA #0
  950  STA Block+9:LDA #8
  960 .ReadBlock:LDX #Block MOD 256
  970  LDY #Block DIV 256:JMP osgbpb
  980 .Restore:LDX #3
  990 .RestoreLoop:LDA Spare,X
 1000  STA ZeroPage,X:DEX
 1010  BPL RestoreLoop:RTS
 1020 .Block
 1030  OPT FNequB(0):OPT FNequD(Text)
 1040  OPT FNequD(0):OPT FNequD(0)
 1050 .Text:OPT FNequS(STRING$(13," "))
 1060 .Block2:OPT FNequW(Text+1)
```

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MicroLink

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Turn to Page 134 ▶

◄ From Page 133

```
1070  OPT FNequD(0):OPT FNequD(0)
1080  OPT FNequD(0):OPT FNequD(0)
1090 .Spare:OPT FNequD(0)
1100 .AreYouSure
1110  OPT FNequS(" ? csid elohw lliK")
1120 .KillString
1130  OPT FNequS(" gnilliK")
1140  OPT FNequB(13)
1150 .Delete
1160  OPT FNequS("DELETE ")
1170 .Access
1180  OPT FNequS("ACCESS ")
1190 .KilledDir
1200  OPT FNequS(STRING$(10," "))
1210  OPT FNequB(13)
1220 .Dir
1230  OPT FNequS("DIR"+STRING$(4," ")+"
"")
1240  OPT FNequB(13)
1250 .Command
1260  OPT FNequS("DIR"+STRING$(4," "))
1270 .DirName
1280  OPT FNequS(Blank$)
1290  OPT FNequB(13)
1300 ]:NEXT
1310 PROCcli("*SAVE DirKill "+STR$~B%+"
"+STR$~P%)
1320 END
1330 DEF FNequB(B%):?P%=B%:P%=P%+1:=I%
1340 DEF FNequW(W%):!P%=W%:P%=P%+2:=I%
1350 DEF FNequD(D%):!P%=D%:P%=P%+4:=I%
1360 DEF FNequS(s$)
1370 $P%=s$:P%=P%+LENs$:=I%
1380 DEF PROCcli($&700):LOCAL X%,Y%
1390 Y%=7:CALL&FFF7:ENDPROC
```

Get it right!

```
  10 =    0 0   190 = 2F30 5   370 = E8CD C   550 = D2E8 D   730 = 9518 C   910 = 1A7D 3  1090 = 6E3D 8  1270 = 9644 E
  20 =    0 0   200 = AEB9 4   380 = 9D32 F   560 = 4E5B E   740 = D5C7 4   920 = CD3B 2  1100 = A653 2  1280 = EFBB 5
  30 =    0 0   210 = E35D A   390 = 3906 6   570 = F67D D   750 =  E31 4   930 = 5B7F F  1110 = 52AC A  1290 = 8374 E
  40 =    0 0   220 = C648 2   400 = 869A 4   580 = 3727 1   760 = EC56 B   940 = 7DF2 B  1120 = 836E F  1300 = DA42 F
  50 =    0 0   230 =  C4A 3   410 = 515C 4   590 = F985 D   770 = 9230 9   950 = 22BC E  1130 = D8F1 9  1310 = 8FED F
  60 =    0 0   240 = 5C73 8   420 = EB1D 1   600 = 2B50 E   780 = 82A6 0   960 = 94BD 5  1140 = 8374 9  1320 = FD2E 2
  70 = CA2C C   250 = 71AE 3   430 = A37B E   610 = 25A1 A   790 = D75A 8   970 = B07F F  1150 = 94A1 A  1330 = B599 6
  80 = EC4A 5   260 = 15F1 E   440 = 3334 7   620 = CC6C D   800 = 844C 5   980 = EEC5 B  1160 = 1C37 1  1340 = C48F 4
  90 = 5AFF B   270 = F40B C   450 = E38C 7   630 = BE54 E   810 = 5C1D D   990 = 3D15 F  1170 = 25AB F  1350 = 5026 4
 100 = 5A42 B   280 = D089 7   460 = 18C1 4   640 = A096 B   820 = B8AF 0  1000 = 455E 9  1180 = 3A33 E  1360 = 46A9 D
 110 = 8D49 F   290 = A85C 5   470 = CC4B E   650 = 2DDA C   830 = A4BF 3  1010 = CED6 5  1190 = BD02 7  1370 = 34CE A
 120 = 8F1A 7   300 = 10E0 E   480 = EAD9 B   660 =  A57 C   840 = 4402 E  1020 = C24E A  1200 = 5781 5  1380 = E297 B
 130 = 33D6 6   310 = 936B 8   490 = 29A4 1   670 = D1B0 B   850 = D6C1 7  1030 = 184A 3  1210 = 8374 6  1390 = 50E0 B
 140 = A418 4   320 = ADE3 B   500 = C3DB 7   680 = 69B4 F   860 = 1CEC 9  1040 = FE1A F  1220 = BB1E 5
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 160 = 22FB 5   340 =  DA1 E   520 = 32DC E   700 = 1CE4 8   880 = 68A8 7  1060 = 9CAB 5  1240 = 8374 B
 170 = D374 1   350 = DC94 5   530 = 852C 1   710 = B93C F   890 = 4EB0 1  1070 = FE1A 2  1250 = 8AA2 C
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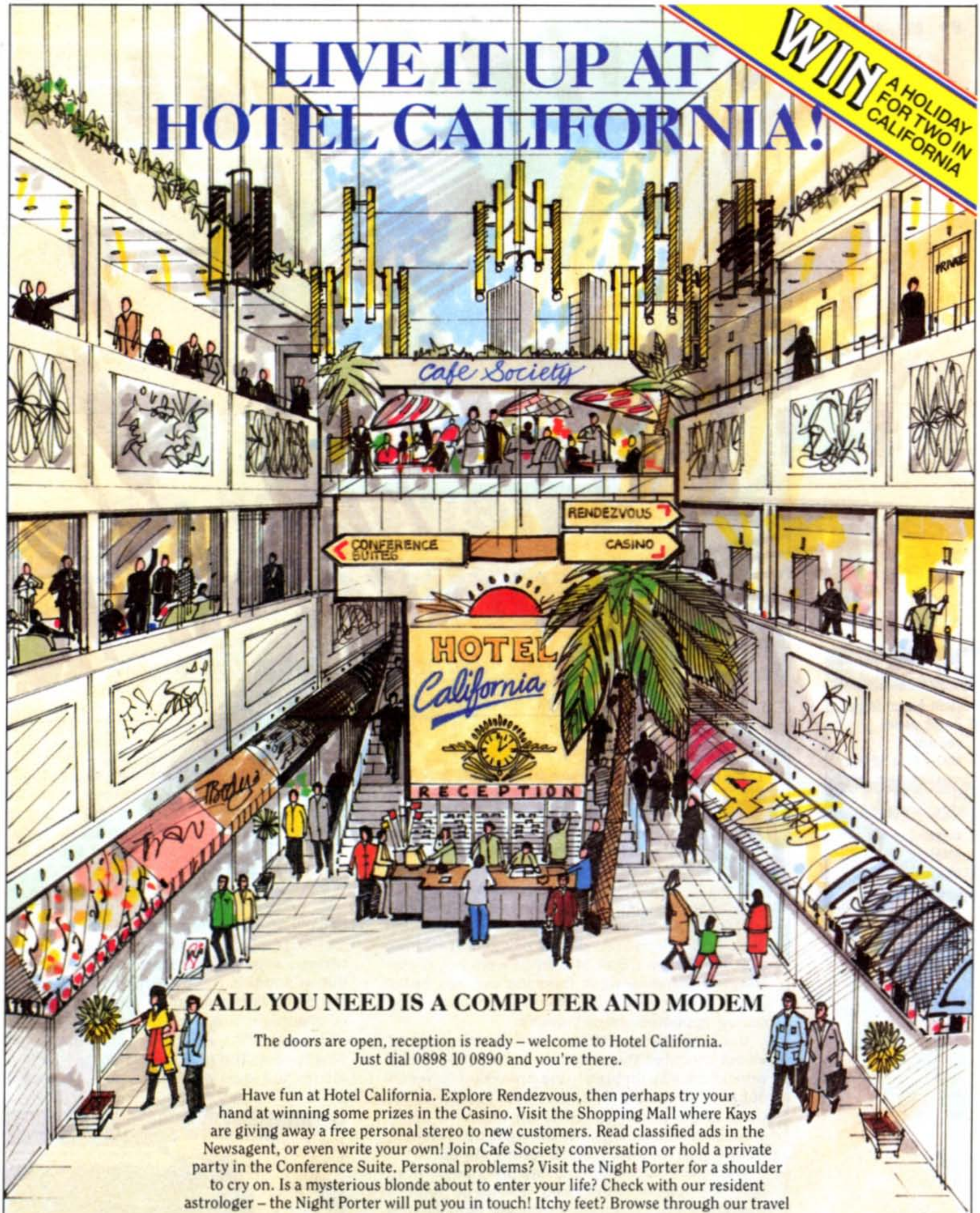
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A new star on the printer scene

Steve Turnbull investigates a novel near letter quality printer

Points for:

- Twin paper input
- Front panel control
- Many type styles

...against:

- Ragged draft printing
- Manual doesn't use BBC Basic

FOR normal home use a printer needs to do two things: Print listings and screen dumps, for which you need continuous sprocket-fed paper, and print letters on single sheets. Many people compromise and use standard listing paper for letters too, but it doesn't look good.

It would be nice to be able to feed your own letterhead through when you need to, and the LC-10 just might be the answer.

My first impressions of this new relatively low-cost printer from Star Micronics were not promising. After removing it from the copious packaging it was very light and the cheap-looking casing appeared virtually empty.

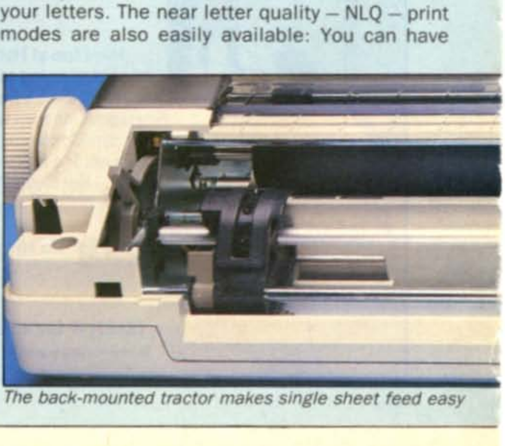
Deciding that discretion was the better part of valour I located the installation instructions and worked my way through – the only point to watch out for if you're the type who never reads instructions is the protective cover on the print head. The ribbon cable plugs into the right side near the front – just the wrong place for my set up.

The next disappointment was the guide unit to take the single sheet feed. Cheap is right, I thought, there's not even a sprocket feed for continuous paper. I have never been so wrong. Not only does the LC-10 take single sheet – it also takes continuous stationery at the *same time*. The sprocket feed unit is hidden under a cover at the back and once you've fed the paper through the first time you need never remove it – even if you want to use single sheet.

The printer is able to park sprocket feed paper by feeding it backwards until it's free of the platen – paper roller – then you can set up the single sheet guide and print your letters. To get back to continuous feed all you do is remove any paper, demount the guide switch to continuous, pull back the bail rod and the printer then feeds the paper directly up into position. Simple.

Moving on to the printing itself, the LC-10 is fully Epson-compatible even down to the quad density and CRT graphics modes. And it accepts all the usual font commands: Elite and pica, condensed, expanded, proportional, italic and so on. But in addition there are commands to produce the draft characters in double height and double or quadruple size.

But you don't want to use the draft mode for your letters. The near letter quality – NLQ – print modes are also easily available: You can have

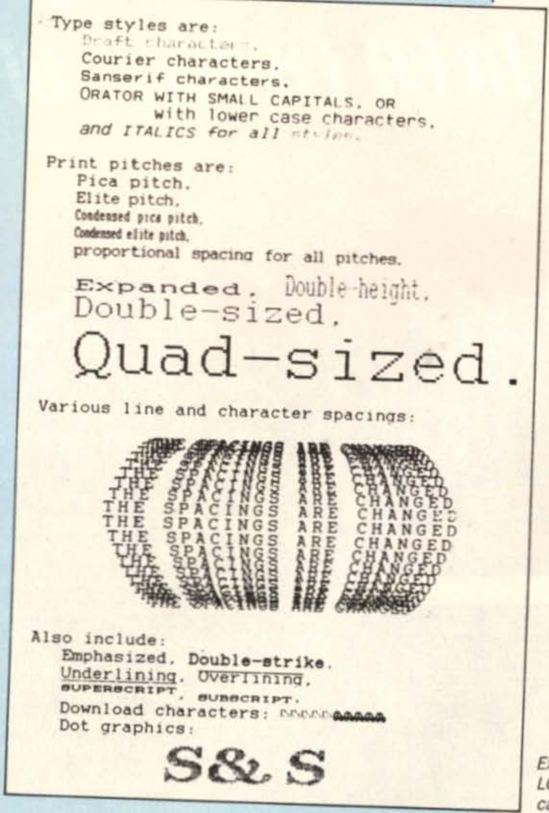


The back-mounted tractor makes single sheet feed easy

Printer	**LC-10**	**KX-P1081***
Quoted draft speed	120	120
Quoted NLQ speed	30	24
Number of NLQ fonts	6	1
Continuous paper	Pushing tractor feed	Pulling tractor feed
Single sheet	Guided friction	Unguided friction
Paper loading	Semi-automatic	Manual
Front panel	20 functions	4 functions
Price	£229	£186

** The Panasonic KX-P1081 printer was reviewed in the October 1987 issue of* The Micro User.

Comparison of LC-10 specifications with another Epson-compatible machine



Type styles are:
Draft characters.
Courier characters.
Sanserif characters.
ORATOR WITH SMALL CAPITALS, OR
with lower case characters.
and ITALICS for all styles.

Print pitches are:
Pica pitch.
Elite pitch.
Condensed pica pitch.
Condensed elite pitch.
proportional spacing for all pitches.

Expanded. Double-height.
Double-sized.
Quad-sized.

Various line and character spacings:

THE SPACINGS ARE CHANGED
THE SPACINGS ARE CHANGED
THE SPACINGS ARE CHANGED

Also include:
Emphasized. Double-strike.
Underlining. Overlining.
SUPERSCRIPT. SUBSCRIPT.
Download characters:
Dot graphics:

S&S

Examples of the LC-10 printing capabilities

three fonts – all selectable with control codes if you want variety – Courier, sanserif and two versions of Orator. You can have any of these in italics, too.

Finally, for all those special symbols you've wanted to print but always had to write in afterwards by hand, there is an area of ram in the printer into which you can place your own character definitions, even for NLQ printing.

The primary functions can be controlled from the front panel using four touch switches – which thankfully beep when selected. The major draft print styles and all the NLQ fonts can be selected, plus main paper movements – line feed, form feed and printer park.

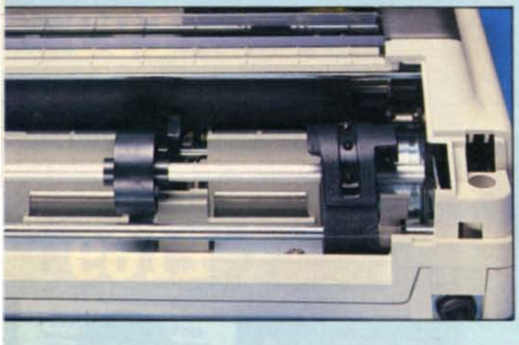
A sticky label is provided with all the functions available from the panel, and this can be stuck on to the printer – but I never found a real need for it since the more obscure options were accessible from software.

There are bound to be drawbacks with a printer costing under £250, but these are few. In draft mode – which is quite fast – the left hand margin is a bit uneven. There is a program for designing NLQ characters in the manual but it's not written in BBC Basic and would take a fair amount of work to convert. Designing by hand is not too tiresome, so this is not a disaster.

On the whole the manual is satisfactory – printer manuals are notoriously bad for not telling you what you need to know. The chapter on setting up the machine and getting it to do its tricks with the paper is very clear, with plenty of diagrams.

Instead of the old style page by page description of control codes there are whole chapters dedicated to such things as using the machine with commercial software and using it from Basic – but that's not BBC Basic and there's nothing about the VDU command.

I've never really enthused about a printer before – it's usually a fight to get one to do anything – but I found the LC-10 a joy to use. If you're not confident about using control codes the front panel makes it easy to select your print style. And you have the best of both worlds with the continuous or single sheet feed without the need to remove the unused paper.



Product: LC-10
Price: £229
Supplier: Star Micronics UK Ltd
Address: Craven House, Uxbridge Rd, Ealing, London W5 2BS
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The bottom line...

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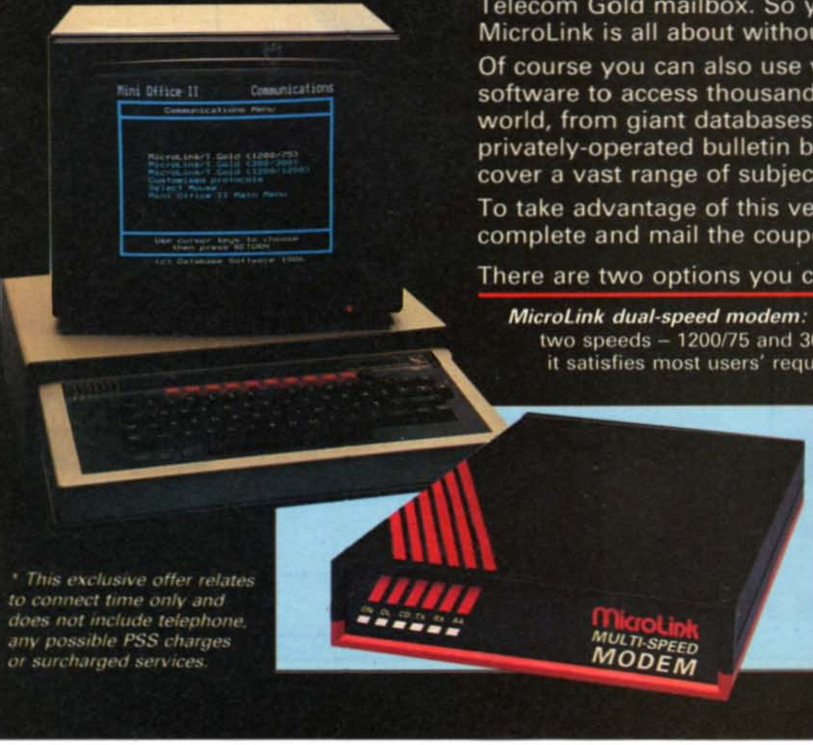

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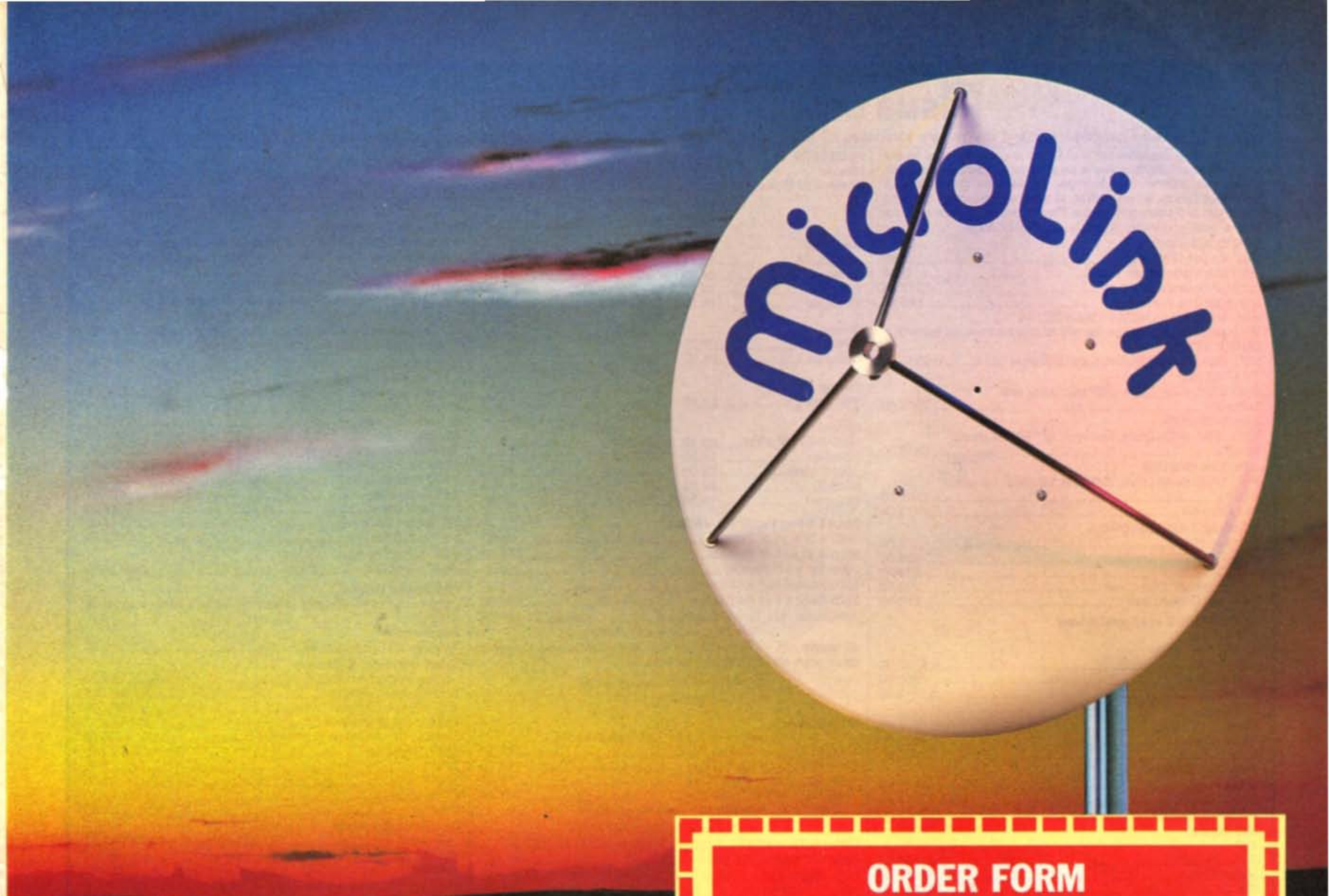

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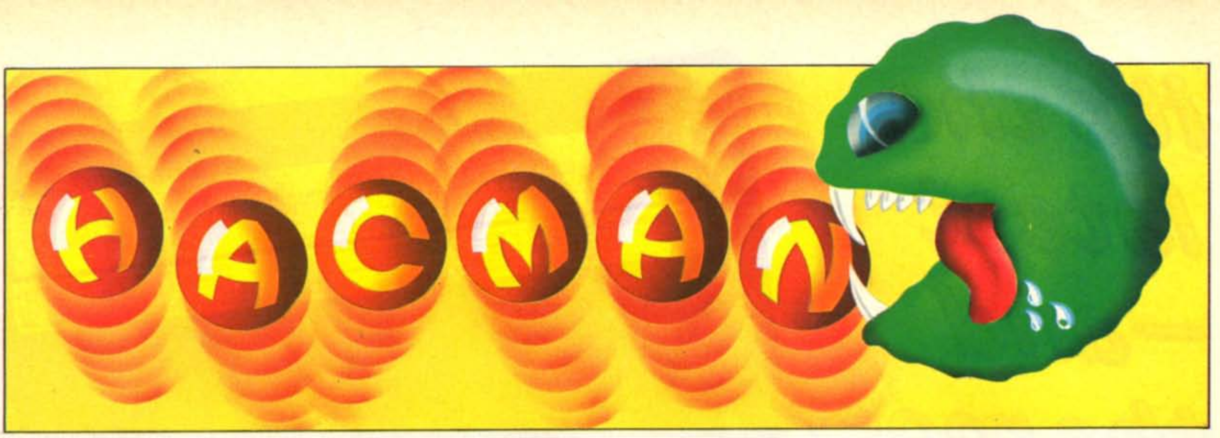

B B+ M Compact

Masterly selection

Hac Man looks over goodies on offer to Compact owners

Featuring:
Play it Again Sam,
Stryker's Run,
Codename: Droid,
Thrust, Grand Prix
Construction Set

AS promised, this month's offering features a few goodies for Master Compact owners. I try to cater for as many areas of the BBC Micro market as possible, and it occurred to me that I have not featured very much for the Compact. In fact, apart from last month's Codename: Droid cheat, I have featured only the extra/infinite lives pokes for the extended version of Stryker's Run in our May 1987 issue.

To make amends, I have written a couple of routines to give extra lives on the two **Play it Again Sam** versions of **Stryker's Run**, and infinite lives and fuel for **Thrust** from the same compilation.

For the standard version of Stryker's Run, enter Listing I and save it on a blank disc. Then type RUN and follow the on-screen instructions. For Thrust enter Listing II and follow the same procedure. For the extended version of Stryker's Run, put the Play It Again Sam disc into the drive and type:

```
*MOUNT
PAGE=&A00
LOAD"SRRUN"
25. ?&C5CE=&24
```

then enter:

```
122 !&25DF=&CE6001A9:!&2920=&200801A9
```

for infinite lives, or alternatively:

```
122 ?&211B=n
```

where n is the number of lives. Type:

```
RUN
```

and the game will load with the appropriate modifications.

Line 25 is a fix for the bug in this version of the game. The sky is normally patrolled by aggressive Volgans in helicopters, and others that ride around on what I can best describe as jet-bikes, seemingly just having a good time. If the game is loaded as normal, the helicopters and jet bikes are locked together, trying desperately to move apart.

When Commander Stryker approaches the helicopter it will attempt to bomb him, succeeding only in destroying the jet bike and itself in the ensuing blast. If you just want an unfair advantage rather than a full-blown cheat, leave it as it is.

Brief history

Acorn designed the Master 128 as the logical successor to the BBC B, compatible with all external add-ons and all legally-written software, but providing a number of the most popular expansions – such as sideways and shadow ram – as standard.

The Compact was in turn designed as a cut-down 128, for the many computer users who would never make use of the extra versatility offered by the full-spec machine, and also to offer a lower-cost entry to the BBC Micro market, in the same way that the Electron was designed to be an entry level Model B.

Both Master 128 and Compact have been designed to use the standard disc format – as provided by Acorn – of their respective predecessors: 5.25in single-density DFS format for the 128 (although the machine also has the double-density ADFS built in), and 3.5in ADFS format for the Compact, although DFS is also provided on the Welcome disc. For this reason, all the games designed to run on the Master 128 are supplied on 5.25in disc, because they are generally designed to run on the B and B+ models as well.

However, it has been brought to my attention that not all Master 128 owners use 5.25in disc drives. I was recently speaking to two local busi-

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Listing I: Stryker's Run extra/infinite lives

```
   10 REM Stryker's Run extra/infinit
e lives
   20 REM Master Compact Play It Agai
n Sam standard version
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 FOR I%=0 TO 2 STEP 2:P%=&900:[O
PT I%
   60 LDA#&A9:STA &2893:STA &2C32:LDA
#1:STA &2894:STA &2C33:\ infinite liv
es
   70 LDA#L%:STA &2465:\ no. of lives
   80 JMP &576F
   90 ]:NEXT:*FX15
  100 PRINT"Please insert Sam disc an
d hit a key...";
  110 A%=GET:*MOUNT
  120 !&C564=&FF0900FF
  130 *RUN SETSCR
```

Get it right!

```
10 =     0 0    80 = 5DF3 1
20 =     0 0    90 = 7EF1 2
30 =     0 0   100 = 34DF 9
40 =     0 0   110 = 11A2 F
50 = 136B B    120 = BBB3 8
60 = CD52 3    130 = FBAA 0
70 = F93D 4
```

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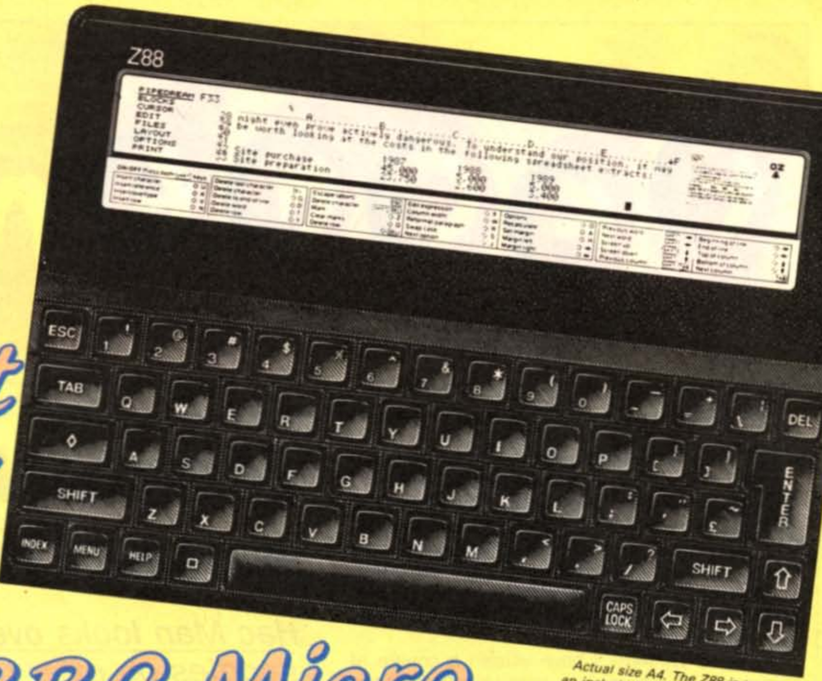

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Listing II: Thrust infinite lives/fuel

```
   10 REM Thrust infinite lives/fuel
   20 REM Master Compact Play It Agai
n Sam version
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 FOR I%=0 TO 2 STEP 2:P%=&120:[O
PT I%
   60 LDA#0:STA &56EB:JSR &5720
   70 .call2 LDA#0:STA &5685:LDA#&60:
STA &56C7:JSR &5633
   80 LDA#0:STA &1971:STA &1981:\ inf
inite lives
   90 LDA#0:STA &1A54:STA &1A56:\ inf
inite fuel
  100 JMP &3C80
  110 ]:P%=&5AF1:[OPT I%
  120 LDX#&FF:TXS:JMP call2
  130 ]:NEXT:*FX15
  140 PRINT"Please insert Sam disc an
d hit a key...";
  150 A%=GET:*MOUNT
  160 ?&C76E=1
  170 *RUN THRUST3
```

Get it right!

```
10 =     0 0   70 = 8DB0 8  130 = 7EF1 0
20 =     0 0   80 = FBD0 2  140 = 34DF B
30 =     0 0   90 = F82B 8  150 = 11A2 A
40 =     0 0  100 = 43FC C  160 = 3791 7
50 = 6F6F F  110 =  C4D 2  170 = A69A 6
60 =  DFD 1  120 = ADE9 5
```

◀ ***From Page 141***

nessmen, each of whom uses a Master 128 with a 3.5in disc drive, a set-up both prefer to conventional drives. However, like most of us, they would also like to be able to play a few games.

Now it should theoretically be possible to use games designed for the Compact on this combination, but in practice this is not always the case, because of a few subtle differences between the two machines.

Superior very kindly sent me Compact versions of a number of their games. I tried them, and any others I could get hold of, on my Master 128 with a borrowed 3.5in drive – to a rather mixed reception.

Bonecruncher, **Elixir**, **Palace of Magic** and **Spellbinder** all worked without a hitch. **Play it Again Sam** also worked perfectly, apart from the Stryker's Run bug mentioned earlier, but the given cure works just as well on a Master 128.

There was a peculiar problem with **Life of Repton**. On a Master 128 or Compact, both parts of the game are loaded into sideways ram. When the Compact version is loaded into a Master 128, however, the editor loads perfectly but the game itself seems to get lost somewhere along the way. When you press Break to switch between the two, you are presented either with the editor (as normal) or a blank screen. Strange...

The other six, **Codename:Droid**, **Crazee Rider**, **Elite**, **Grand Prix Construction Set**, **Revs** and the original stand-alone **Stryker's Run** all failed to load, coming up with the message:

```
!!DISC FAULT!!
UNABLE TO LOAD
```

This message is actually generated by the protection system if – for any reason – it decides that all is not as it should be. I asked Rob Northen, the author of the protection systems used on these games – and on all but the very latest of Superior's Compact releases – if he knew of any compatibility problems with these games. His answer was that all the protection systems used on the games were written using a Master 128 and 3.5in disc drive – the exact combination on which these games are now failing to load.

Any ideas?

Nick Anderson has pointed out a peculiarity in the Compact version of Superior's **Grand Prix Construction Set**. Although the instructions say that self-designed circuits can be saved to a blank disc, attempting to do so generates the error message *Disc changed*. What is more, most people have the sense to make sure that any new game is write-protected before trying to boot it. If you try to save a track to the original program disc, you get the message *Disc protected*.

The problem is that Grand Prix Construction Set was originally written on a machine that uses the DFS filing system, not the ADFS system built into the Compact. The ADFS holds a copy of the currently selected disc catalogue in ram, and checks this catalogue before even thinking about accessing the disc.

So if you put a new disc into the drive, the ADFS will not realise that it is a new one until it is

Turn to Page 144 ▶

ROM PROBLEMS

One well-known point that has never previously gained a mention in these pages is that sideways roms can interfere with games and other software, causing them either to function incorrectly or simply not work at all. Disc Doctor is, rightly or wrongly, (in)famous for clashing with almost everything, but it is by no means the only one.

Something rather strange happens when last month's biggie, ***Codename:Droid****, is loaded into a machine fitted with Computer Concepts' Spellmaster rom. When you, as Stryker, seek to penetrate the Surface Defence, you discover that all the ropes now have cyan and red spikes protruding from the left-hand side, making it impossible to jump on or off a rope from that side. The problem seems to occur just after you have accessed your wrist terminal, and terminal it certainly is.*

Codename:Droid, like many programs, makes use of the OS read character routine osrdch to check for incoming characters, normally from the keyboard. The osrdch entry point &FFE0 is indirected through the two-byte vector rdchv *at &210 and &211. However, Spellmaster changes this vector, so any call to osrdch will have a different effect. Luckily simple problems usually have simple solutions.*

Just enter this line before running the game:

```
Z%=!&FFB7:!&210=Z%!&10
```

This short routine reads the default value of rdchv *from the OS rom and pokes it back into &210 and &211, thereby disabling Spellmaster's side effect.*

◀ *From Page 143*

*MOUNTed. The DFS, however, does not store a copy of the catalogue – instead it physically accesses the disc every time you issues a disc-specific command. Therefore no *MOUNT command is needed or even exists. The problem is now quite clear: The Compact version of Grand Prix Construction Set should, but doesn't, issue a *MOUNT command before attempting to load or save a newly-designed track. The only possible solution to this problem goes against all the rules – you actually have to save the new tracks on to the game disc.

I think that the method I am about to outline – Nick's own – although by no means the only one, is probably the neatest.

First, make sure that the write-protect catch on the disc is set to *write-enable*, so that the hole is covered up. Then insert the disc into the drive and type:

```
*MOUNT
*CDIR T
```

This creates a directory T, which can be used for storing your own tracks. So, if you have just designed a replica of the US Watkins Glen circuit, simply save it as T.WATGLEN.

You could call the new directory something like TRACKS, but this would mean that the actual filenames would have to be shorter and therefore less meaningful.

Lastly, I must stress that this is an extreme exception. In general you should *never* save anything onto the original program disc – you will almost certainly do it irreparable damage. You have been warned . . .

DROID ADDITION

When I originally wrote the solution to Codename:Droid I decided to feature it in the April column because it would appear a few days after the closure of the competition associated with the game. The idea was to keep everyone happy by featuring hints and cheats for a popular and still fairly recent game, but to prevent cheating in the competition. However, since I finished that column, it has been brought to my attention that Commander Stryker is by no means finished yet.

By the time you come to read this, Superior's new compilation, ***Play It Again Sam II,*** *should be in the shops featuring, of course, Codename:Droid. At the time of writing I have not seen Play It Again Sam II, but I would be surprised if the cheat routines given last month actually work on the versions of Codename:Droid on Sam II, because the loaders will almost certainly be different.*

I have received quite a few letters pointing out that pokes given for games that have since appeared on the original Play It Again Sam do not work with the versions on this compilation. This is because all the Sam I games have loaders slightly different to those of the original stand-alone games. Watch this space...

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```
  10 REM The Sky at Night
  20 REM by Bernard Mitchell
  30 REM (c) The Micro User
  40 PROCreloc(&E00):MODE 1
  50 PROCinit:FOR I%=0 TO N%-1
  60 K%=EVAL("FN_"+A$(I%)):NEXT
  70 I%=0:REPEAT PROCflash(A$(I%))
  80 I%=(I%+1)MODN%:UNTIL FALSE:END
  90 DEF FN_Orion
 100 VDUM%;750;370;D%,M%;840;360;D%
 110 VDUM%;790;410;C%,M%;800;374;C%
 120 VDUM%;790;360;B%,M%;780;350;B%
 130 VDUM%;800;320;B%,M%;800;350;A%:=0
 140 DEF FN_Pleiades
 150 VDUM%;800;660;F%:=0
 160 DEF FN_Ursa_major
 170 VDUM%;400;620;C%,M%;380;580;B%
 180 VDUM%;340;600;B%,M%;350;630;A%
 190 VDUM%;340;660;C%,M%;330;690;B%
 200 VDUM%;300;720;C%:=0
 210 DEF FN_Ursa_minor
 220 VDUM%;470;740;C%,M%;460;760;A%
 230 VDUM%;440;770;A%,M%;420;770;A%
 240 VDUM%;400;760;B%,M%;380;780;A%
 250 VDUM%;410;790;A%:=0
 260 DEF FN_Cassiopeia
 270 VDUM%;610;830;B%,M%;630;820;B%
 280 VDUM%;620;800;B%,M%;640;790;B%
 290 VDUM%;650;770;A%,M%;640;760;A%
 300 VDUM%;600;810;A%:=0
 310 DEF FN_Cepheus
 320 VDUM%;520;840;A%,M%;550;870;A%
 330 VDUM%;510;890;A%,M%;570;910;A%
 340 VDUM%;530;930;B%:=0
 350 DEF FN_Andromeda
 360 VDUM%;720;790;B%,M%;680;830;A%
 370 VDUM%;730;840;B%,M%;710;850;A%
 380 VDUM%;740;880;A%,M%;720;880;A%
 390 VDUM%;740;930;A%,M%;690;970;B%:=0
 400 DEF FN_Aries
 410 VDUM%;820;820;C%,M%;830;840;B%
 420 VDUM%;850;850;B%:=0
 430 DEF FN_Perseus
 440 VDUM%;680;700;B%,M%;670;690;A%
 450 VDUM%;670;710;A%,M%;690;710;A%
 460 VDUM%;680;730;B%,M%;670;750;A%
 470 VDUM%;700;740;A%,M%;720;740;A%
 480 VDUM%;730;750;C%,M%;740;760;A%
 490 VDUM%;710;710;A%,M%;730;700;A%
 500 VDUM%;750;710;B%,M%;760;720;A%:=0
 510 DEF FN_Auriga
 520 VDUM%;630;530;C%,M%;640;570;D%
 530 VDUM%;650;510;B%,M%;700;520;B%
 540 VDUM%;710;570;B%,M%;660;570;A%
 550 VDUM%;650;590;A%,M%;670;590;A%:=0
 560 DEF FN_Taurus
 570 VDUM%;700;520;B%,M%;740;490;B%
 580 VDUM%;790;570;D%,M%;800;580;A%
 590 VDUM%;790;600;A%,M%;780;590;A%
 600 VDUM%;770;580;A%:=0
 610 DEF FN_Gemini
 620 VDUM%;530;410;C%,M%;540;440;C%
 630 VDUM%;550;400;A%,M%;560;430;B%
 640 VDUM%;570;390;A%,M%;590;420;A%
 650 VDUM%;590;370;A%,M%;600;390;C%
 660 VDUM%;610;430;A%,M%;620;440;A%:=0
 670 DEF FN_Eridanus
 680 VDUM%;870;430;B%,M%;910;460;B%
 690 VDUM%;910;510;A%,M%;930;530;A%
 700 VDUM%;980;560;A%,M%;950;580;A%
 710 VDUM%;970;630;A%,M%;980;650;B%:=0
 720 DEF FN_Cetus
 730 VDUM%;910;740;B%,M%;890;750;A%
 740 VDUM%;880;780;A%,M%;890;800;A%
 750 VDUM%;910;790;A%,M%;930;770;A%:=0
 760 DEF FN_Monocerus
 770 VDUM%;480;190;A%,M%;500;210;A%
 780 VDUM%;520;200;A%,M%;540;210;A%
 790 VDUM%;630;280;A%,M%;660;260;A%
 800 VDUM%;640;260;A%,M%;600;210;A%
 810 VDUM%;670;220;A%,M%;650;200;A%
 820 VDUM%;570;190;A%,M%;550;170;A%
 830 VDUM%;560;150,A%:=0
 840 DEF FN_Canis_minor
 850 VDUM%;560;250;D%,M%;580;260;B%:=0
 860 DEF FN_Canis_major
 870 VDUM%;640;150;A%,M%;670;160;D%
 880 VDUM%;700;170;C%,M%;660;120;A%
 890 VDUM%;650;100;C%,M%;630;70;B%
 900 VDUM%;660;80;C%,M%;710;100;A%:=0
 910 DEF FN_Puppis
 920 VDUM%;480;80;B%,M%;500;100;B%
 930 VDUM%;510;90;A%,M%;530;80;A%
 940 VDUM%;520;60;B%,M%;490;40;B%
 950 VDUM%;560;40;B%:=0
 960 DEF FN_Pyxis
 970 VDUM%;420;80;A%,M%;430;50;A%
 980 VDUM%;450;40;A%:=0
 990 DEF FN_Hydra
1000 VDUM%;150;250;A%,M%;190;230;B%
1010 VDUM%;240;220;A%,M%;290;210;C%
1020 VDUM%;330;230;A%,M%;260;230;A%
1030 VDUM%;410;220;B%,M%;430;200;A%
1040 VDUM%;420;180;A%,M%;390;190;A%
1050 VDUM%;390;210;A%:=0
1060 DEF FN_Cancer
1070 VDUM%;400;370;A%,M%;410;340;A%
1080 VDUM%;410;310;A%,M%;380;270;A%
1090 VDUM%;460;360;A%,M%;450;280;A%
1100 VDUM%;440;310;F%:=0
1110 DEF FN_Sextans
1120 VDUM%;240;260;A%,M%;240;310;A%
1130 VDUM%;260;330;A%,M%;270;300;A%:=0
1140 DEF FN_Leo
1150 VDUM%;180;490;B%,M%;200;460;A%
1160 VDUM%;220;480;B%,M%;260;400;C%
1170 VDUM%;280;420;A%,M%;270;440;C%
1180 VDUM%;290;450;A%,M%;310;440;B%
1190 VDUM%;310;420;A%:=0
1200 DEF FN_Crater
1210 VDUM%;50;450;A%,M%;60;420;A%
1220 VDUM%;90;410;A%,M%;90;380;A%
1230 VDUM%;110;420;A%,M%;130;440;A%
1240 VDUM%;130;470;A%:=0
1250 DEF FN_Virgo
1260 VDUM%;100;630;B%,M%;80;630;A%
1270 VDUM%;60;620;B%,M%;70;590;A%
1280 VDUM%;80;550;A%,M%;100;550;A%:=0
1290 DEF FN_Leo_minor
1300 VDUM%;280;540;A%,M%;290;510;A%
1310 VDUM%;310;500;A%,M%;310;530;A%:=0
1320 DEF FN_Bootes
1330 VDUM%;160;790;D%,M%;150;820;B%
1340 VDUM%;150;770;A%,M%;130;760;A%
1350 VDUM%;200;820;B%,M%;200;790;A%
1360 VDUM%;240;840;A%,M%;260;810;A%
1370 VDUM%;240;780;B%:=0
1380 DEF FN_Lynx
1390 VDUM%;450;480;A%,M%;460;500;A%
1400 VDUM%;480;550;A%,M%;510;560;A%
1410 VDUM%;530;580;A%,M%;550;600;A%:=0
```

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Get it right!

```
  10 =    0 0 |  390 = 3314 5 |  770 = 42E6 5 | 1150 = 5414 4 | 1530 = D3A7 F | 1910 = FBD3 1
  20 =    0 0 |  400 = 8C65 C |  780 = 2BD3 7 | 1160 = F04C A | 1540 = BFE3 2 | 1920 =  42D 1
  30 =    0 0 |  410 = 9BDA 8 |  790 = 979F F | 1170 = 9428 1 | 1550 = 229B F | 1930 = 46EF 4
  40 = B84E E |  420 = 50EC 5 |  800 = F5ED 2 | 1180 = CDC0 D | 1560 = 4644 F | 1940 = BF0C 6
  50 = 7B23 7 |  430 = A329 D |  810 = CF72 1 | 1190 =  51D 4 | 1570 = 4BB9 3 | 1950 = 51F8 2
  60 = F4B8 E |  440 = 33CE F |  820 = 3267 5 | 1200 = B8D4 2 | 1580 = E66F 5 | 1960 = 3721 8
  70 = 7045 0 |  450 =  24D F |  830 = E02C 6 | 1210 =  A73 4 | 1590 = FFCD 3 | 1970 = 49AB F
  80 = 702A 3 |  460 = 8F45 A |  840 = 2281 C | 1220 = 158D 0 | 1600 = 62FF A | 1980 = 8097 E
  90 = 6F9A 5 |  470 = C0F7 7 |  850 = 8354 D | 1230 = FB5F 4 | 1610 = A1EC 8 | 1990 = 66B1 0
 100 = 1C25 7 |  480 = EF97 2 |  860 = 7B82 0 | 1240 = C18F 1 | 1620 = E2A6 C | 2000 = 5AB4 0
 110 = E14D 7 |  490 = 51D9 C |  870 = 3E52 A | 1250 = EC1E D | 1630 = 56C4 C | 2010 = F6E1 E
 120 = 3962 9 |  500 = E37E 5 |  880 = FCFA 1 | 1260 = DA6E 1 | 1640 = 8C93 2 | 2020 = 85D3 F
 130 = BC25 B |  510 = 9139 9 |  890 = CD4D A | 1270 = 4188 0 | 1650 = 1117 2 | 2030 = F5FD A
 140 = 4EF7 5 |  520 = E653 F |  900 = 49D3 D | 1280 = E9B4 5 | 1660 = 726D A | 2040 = 4D8C E
 150 = 6C49 B |  530 = D628 4 |  910 = EFFB 0 | 1290 = EA59 3 | 1670 = 4850 7 | 2050 = 4922 5
 160 = 2881 0 |  540 = C2EF 2 |  920 = 57B9 4 | 1300 = 3679 2 | 1680 = 4C67 B | 2060 = ED0F 8
 170 = 1FBD E |  550 = 4673 4 |  930 = BAB3 E | 1310 = 7EBC E | 1690 = C988 0 | 2070 = D028 8
 180 = 33FD 6 |  560 = F03D D |  940 = 9230 7 | 1320 = 6A2F 6 | 1700 = EA61 6 | 2080 = 92A2 9
 190 = 36AC 9 |  570 = 479D B |  950 =  6B1 D | 1330 = 8DEF 3 | 1710 = ED0F 3 | 2090 = F842 0
 200 = 6FAF 2 |  580 = 1CEA E |  960 =  D4F 9 | 1340 = 3DE4 C | 1720 = 5A45 6 | 2100 = 9CFA B
 210 = 7182 F |  590 = 85C9 C |  970 = 8338 A | 1350 = 3778 6 | 1730 = 3E35 2 | 2110 = AD4E F
 220 = 9B28 4 |  600 = 71D1 8 |  980 = 93EC E | 1360 = 229E 1 | 1740 = 6D91 D | 2120 = 270E 8
 230 = 30E2 8 |  610 = EC5B 2 |  990 = D0C0 A | 1370 = 1C35 5 | 1750 = 52CF 3 | 2130 = 7809 3
 240 = 1426 E |  620 = A5D0 C | 1000 = A819 2 | 1380 = 29B8 1 | 1760 = A87A C | 2140 = 6D31 C
 250 = 34FE A |  630 = E73F 6 | 1010 = 6875 9 | 1390 = D166 8 | 1770 = 606E C | 2150 = 4B23 9
 260 = C9B2 9 |  640 = 8C47 E | 1020 = 10CC 2 | 1400 =  8BD 3 | 1780 = DE90 7 | 2160 = 4B39 2
 270 = ACBE A |  650 = 9F96 A | 1030 = 8320 6 | 1410 = 7026 C | 1790 = 4BC0 E | 2170 = B3DA 6
 280 = E9F4 3 |  660 = 844B D | 1040 = 337A 8 | 1420 = 7F88 3 | 1800 = 34DE A | 2180 = A5E6 9
 290 = 15BC C |  670 = D025 F | 1050 = 8C48 8 | 1430 = CF75 A | 1810 = 4BC9 9 | 2190 = BDA5 D
 300 = 3BC3 3 |  680 = 81D0 8 | 1060 = 4041 A | 1440 = CE04 F | 1820 = 44E5 A | 2200 = F124 2
 310 =  DEB 6 |  690 = 7CEA E | 1070 = A714 C | 1450 = DB71 1 | 1830 = 74B9 2 | 2210 = B254 7
 320 = 15B7 C |  700 = 8DB2 7 | 1080 = 534B F | 1460 = B229 7 | 1840 = 9ECD 5 | 2220 = 6626 A
 330 = F2D6 7 |  710 = E50C D | 1090 = 6574 8 | 1470 = 8CC8 8 | 1850 = BB77 0 | 2230 = DB24 5
 340 = 7BAE D |  720 = 802D 8 | 1100 = DFBE 3 | 1480 = 5F99 B | 1860 = F2F8 F | 2240 = 1884 D
 350 = D28A 9 |  730 = AFD9 9 | 1110 = 6F61 4 | 1490 = F096 F | 1870 = 256E A | 2250 = 9F6E 0
 360 = C698 5 |  740 = 33D2 E | 1120 = 5D9B B | 1500 = 50B5 A | 1880 =  BB6 6 | 2260 = E2E5 5
 370 = F011 B |  750 = 4851 2 | 1130 = 3A4D 9 | 1510 = 43DF C | 1890 =  C92 4 | 2270 = FD2E 1
 380 = E753 B |  760 = 4DEA 5 | 1140 = 9D81 6 | 1520 = AD03 E | 1900 = 8C83 7 |
```

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```
1420 DEF FN_Draco
1430 VDUM%;370;720;A%,M%;350;740;A%
1440 VDUM%;330;770;A%,M%;320;830;A%
1450 VDUM%;330;860;A%,M%;370;870;A%
1460 VDUM%;410;850;A%,M%;440;880;A%
1470 VDUM%;430;920;B%,M%;410;950;A%
1480 VDUM%;380;960;A%,M%;390;980;B%
1490 VDUM%;350;970;B%:=0
1500 DEF FN_Corona
1510 VDUM%;230;900;B%,M%;230;880;A%
1520 VDUM%;220;870;A%,M%;210;890;A%
1530 VDUM%;220;910;A%:=0
1540 DEF FN_Canes_Venatici
1550 VDUM%;260;670;B%,M%;280;650;A%:=0
1560 DEF FN_Coma_Berenices
1570 VDUM%;200;630;E%:=0
1580 DEF PROCdelay:*FX15,1
1590 LOCAL T%:T%=TIME+1000
1600 REPEAT UNTIL TIME>T% OR INKEY-99
1610 REPEAT UNTIL NOT INKEY-99:ENDPROC
1620 DEF PROCflash(A$):D$="FN_"+A$
1630 GCOL0,3:X%=EVALD$
1640 PROCname(A$,2):PROCdelay
1650 GCOL0,2:X%=EVALD$
1660 PROCname(A$,1):ENDPROC
1670 DEF PROCname(A$,C%):GCOL 0,C%
1680 LOCAL K%:K%=INSTR(A$,"_")
1690 PROCt(880,900,LEFT$(A$,K%-1))
1700 IF K% PROCt(960,840,MID$(A$,K%+1))
1710 ENDPROC
1720 DEF PROCt(I%,J%,T$):MOVE I%,J%
1730 PRINT T$:ENDPROC
1740 DEF PROCinit:*FX9,20
1750 M%=1049:N%=32:*FX10,20
1760 DIM A$(N%-1)
1770 FOR I%=0 TO N%-1:READ A$(I%):NEXT
1780 VDU19,0,4,0,0;19,1,4,0,0;
1790 VDU19,3,8,0,0;5
1800 GCOL 0,129:CLG:GCOL 0,0
1810 X%=520:R%=500:MOVEX%,1020:P=PI/15
1820 FOR A=0 TO 2*PI+P STEP P
1830 DRAW X%+R%*SINA,X%+R%*COSA:NEXT
1840 FOR Y%=20 TO 1020 STEP 4
1850 PLOT 77,X%,Y%:NEXT
1860 VDU19,0,0;0;
1870 A%=224:B%=225:C%=226
1880 D%=227:E%=228:F%=229
1890 VDU23,A%,0;0;8,0,0;
1900 VDU23,B%,0;0;24,0,0;
1910 VDU23,C%,0;0,24,24,0,0;
1920 VDU23,D%,0;0,24,60,24,0;
1930 VDU23,E%,0,34,136,36,8,34,64,0
1940 VDU23,F%,0;16,36,16,40,0;
1950 GCOL 0,2
1960 PROCt(800,980,"Constellation")
1970 PROCt(40,980,"Night")
1980 PROCt(40,940,"Sky")
1990 PROCt(40,40,"Jan-Apr")
2000 PROCt(X%,1010,"N")
2010 PROCt(10,X%,"E")
2020 PROCt(1000,X%,"W")
2030 PROCt(X%,40,"S")
2040 PROCt(800,80,"Press Space Bar")
2050 PROCt(840,40,"to continue")
2060 ENDPROC
2070 DATA Andromeda,Aries,Auriga
2080 DATA Bootes,Cancer,Canes_Venatici
2090 DATA Canis_major,Canis_minor
2100 DATA Cassiopeia
2110 DATA Cepheus,Cetus,Coma_Berenices
2120 DATA Corona,Crater,Draco,Eridanus
2130 DATA Gemini,Hydra,Leo,Leo_minor
2140 DATA Lynx,Monocerus,Orion,Perseus
2150 DATA Pleiades,Puppis,Pyxis
2160 DATA Sextans,Taurus,Ursa_major
2170 DATA Ursa_minor,Virgo
2180 DEF PROCreloc(Q%):P%=PAGE
2190 IF P%<=Q% OR P%>&8000 ENDPROC
2200 CLS:M%=TOP-PAGE:VDU129,136
2210 PRINT"Relocating...";:*TAPE
2220 FOR L%=0 TO M% STEP 4
2230 SOUND&11,-7,255*L%/M%,2
2240 L%!Q%=L%!P%:NEXT:PAGE=Q%
2250 *KEY0"OLD|MRUN|F|M"
2260 VDU21:*FX138,0,128
2270 END
```

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◀ From Page 95

```
200 DEF PROCkeys
210 FOR A%=0 TO 1:VDU141,129,157,135
220 PRINTSPC10"Chinese chess":NEXT
230 PRINT'TAB(13)"by Daniel Tang"
240 PRINT'SPC2"Keys :":Y%=VPOS-2
250 FOR A%=1 TO 5:READA$
260 PRINTTAB(12,A%*2+Y%)A$:NEXT
270 FOR A%=&900 TO &B3F STEP 4
280 READ A$:!A%=EVAL("&"+A$):NEXT
290 PRINTTAB(11,23)"Press space";
300 REPEATUNTILGET=32:ENDPROC
310 DEF PROCchars
320 PRINTTAB(13,1)"The characters"
330 FOR C%=1 TO 8
340 PROCpchar(3,C%+1,C%)
350 NEXT:VDU5
360 FOR Y%=886 TO 146 STEP-96
370 MOVE610,Y%:PRINT"-"
380 READ A$:MOVE800,Y%
390 PRINTA$:NEXT:VDU4,31,10,30
400 PRINT"How many players? (1/2)";
410 REPEAT A$=GET$
420 UNTIL INSTR("12",A$)>0
430 K%=VALA$:ENDPROC
440 DATA Z - Left,X - Right,* - up
450 DATA ? - down,Return - select
460 DATA 0,30110C03,C0400000,3E604040
470 DATA 0,0,C3A023C,705,3,604040C0
480 DATA 3060C080,10101010,70300,10100
490 DATA FFF020,C0200FF8,20E02030,8040
500 DATA 1010100,1070105,4FC0400
510 DATA 4AF2455,0,0,2020305,7030103
520 DATA 21030605,A0369C40,80000000
530 DATA 80808080,7030C0E,0,FFE020E0
540 DATA F01F00,D870C080,F018,0,0,0,0
550 DATA 0,0,190F0000,27F6134,80000000
560 DATA 4000FFC0,3010000,101CFE07
570 DATA 2E1B0702,38,E33E80,0,15EA7C18
580 DATA F,0,1B0E0800,0,C3000000,0
590 DATA FE000000,7EE0E830,1010183,17E
600 DATA 4ECB8804,4311F103,69C98DC7
610 DATA 1C0F0603,1,6772D158,C0
620 DATA 70D868A9,E0,3000000,180D0406
630 DATA F0000000,820031E,0,70C08000
640 DATA 406C2032,2396D57,88C80D47
650 DATA C14346BC,94048C18,18084C04
660 DATA 705,0,DF4F,3F,3010F030,E0,0,0
670 DATA 0,0,0,0,57643808,40C3861,0
680 DATA 924992FF,0,12367CC0,6070505
690 DATA C,C18181FF,C3,B0F153D2,B0,0,0
700 DATA 0,0,0,78180000,3E000000
710 DATA 742BDD2B,0,FF0000,30604040
720 DATA 30E03010,E06041C,191F
730 DATA FE830000,C140,ECD81010,DCF4
740 DATA 0,8070000,0,C0000000,0
750 DATA 5020000,A0901208,C36678A9
760 DATA 2040705F,8000C020,81EF281
770 DATA 10180808,362C1C0,0,51D15FC0
780 DATA 70,D050D010,70
790 DATA Mouse,Cat,Dog,Wolf,Leopard
800 DATA Tiger,Lion,Elephant
```

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = FF67 7
 50 = FF39 C
 60 = F716 7
 70 = A5F8 A
 80 = 285D 2
 90 = AD21 E
100 = A48A 1
110 = A6CC F
120 = 513F C
130 = AD1E F
140 = 7109 8
150 = 859D 6
160 = B5D3 5
170 = 6D49 F
180 = A476 1
190 = E062 0
200 = 2EDA 0
210 = 1995 9
220 =  16C E
230 = 6457 1
240 = F85E 5
250 = 225E 4
260 = 4C31 8
270 = 455E 6
280 = FCAE E
290 = 51CB D
300 = 54BD 0
310 = B300 6
320 = 4B76 F
330 = 8639 C
340 = D42B F
350 = D972 A
360 = 7048 5
370 = D55A 3
380 =  B1E 4
390 = A356 C
400 = 764E 9
410 = ADFB A
420 = B4CF A
430 = D15F A
440 = 5F9C A
450 =  AA1 C
460 = 5CEF C
470 = 3647 A
480 = 9E86 B
490 = 268E 7
500 = 3F66 0
510 = 33D1 B
520 = 1650 F
530 = 58B8 A
540 = B52C 5
550 = 7A38 5
560 = E6E7 4
570 = CA43 8
580 = D44E F
590 = 2A56 A
600 = 41F8 A
610 = F195 9
620 = 3A5A E
630 = A83F 3
640 = 67F4 D
650 = F616 6
660 = CCD3 4
670 = 9FAA F
680 = F696 A
690 = EDA8 E
700 = 60D0 3
710 = 33E6 4
720 = 71CB D
730 = 753C 2
740 = C9E9 2
750 = 6608 4
760 = 2C92 7
770 = 2BD8 C
780 = 5E33 4
790 = 8CA8 9
800 = 424C B
```

Get it right!

Listing II

```
   10 REM Chinese chess
   20 REM By Daniel Tang
   30 IFPAGE<>&E00GOTO1800
   40 MODE1:VDU23;8202;0;0;0;19,2,6,0,0,
0:*FX11,10
   50 PROCboard:DIMc%(8,10):nm%=8:PROCse
tchars:PRINTTAB(33,4)"Move."
   60 IF K%=1 PROCone ELSE PROCtwo
   70 FORA=20TO150STEP10:SOUND1,-12,A,1:
NEXT
   80 PRINTTAB(0,29)"Again? (y/n)";
   90 REPEATA$=CHR$(GETAND&DF)
  100 UNTIL INSTR("YN",A$)>0:PRINTA$;
  110 IF A$="Y" RUN ELSE END
  120 DEFPROCone:REPEAT:PRINTTAB(31,3)"
 Your  ":PROCusermove(128):IF(c%(4,9)<12
8ANDc%(4,9)>0)ORc%(4,1)>128GOTO140
  130 PRINTTAB(31,3)"   My   ":PROCcompm
ove
  140 UNTIL(c%(4,9)<128ANDc%(4,9)>0)ORc%
(4,1)>128
  150 IFc%(4,1)>127PRINTTAB(31,6)"You wi
n"
  160 IFc%(4,9)<127ANDc%(4,9)<>0PRINTTAB
(33,6)"I win"
  170 ENDPROC
  180 DEFPROCtwo:REPEAT:PRINTTAB(31,3)"P
layer 1":PROCusermove(128):IF(c%(4,9)<12
8ANDc%(4,9)>0)ORc%(4,1)>128GOTO200
  190 PRINTTAB(31,3)"Player 2":PROCuserm
ove(0)
  200 UNTIL(c%(4,9)<128ANDc%(4,9)>0)ORc%
(4,1)>128:PRINTTAB(31,6)"You win":IFc%(4
,1)>127PRINTTAB(31,7)"Player 1"
  210 IFc%(4,9)<127ANDc%(4,9)<>0PRINTTAB
(31,7)"Player 2"
  220 ENDPROC
  230 DEFPROCprintchar(X%,Y%,C%):X%=X%-1
:Y%=Y%-1:IFC%>128C%=C%-128:cl%=2ELSEcl%=
1
  240 W%=&8FF+(72*(C%-1)):M%=&3008+(X%*6
4)+(Y%*&780):FORX%=M%TOM%+&500STEP640:FO
RY%=X%TOX%+32STEP16:FORC%=Y%TOY%+7:W%=W%
+1:Z%=?W%
  250 IFcl%=2?C%=?C%EOR((Z%AND240)+(Z%/1
6)):?(C%+8)=?(C%+8)EOR(((Z%AND15)*16)+(Z
%AND15))ELSE?C%=?C%EORZ%AND240:?(C%+8)=?
(C%+8)EOR(Z%AND15)*16
  260 NEXT,,:ENDPROC
  270 DEFPROCusermove(C%)
  280 IFC%=128P%=1:Q%=0
  290 IFC%=0P%=1:Q%=8
  300 GCOL3,7:FORA%=1TO2:X%=P%:Y%=9-Q%
  310 REPEAT:MOVEP%*128-128,Q%*96+204:DR
AWP%*128,Q%*96+204:*FX21,0
  320 A$=GET$:MOVEP%*128-128,Q%*96+204:D
RAWP%*128,Q%*96+204:IFINKEY-67P%=P%+1
  330 IFINKEY-98P%=P%-1
  340 IFINKEY-73Q%=Q%+1
  350 IFINKEY-105Q%=Q%-1
  360 IFQ%<0Q%=0
  370 IFQ%>8Q%=8
  380 IFP%<1P%=1
  390 IFP%>7P%=7
  400 UNTILINKEY-74:REPEAT:UNTILINKEY-74
=0:IFc%(P%,9-Q%)=0ANDA%=1GOTO310
  410 SOUND1,-7,220,2:NEXT:Q%=9-Q%:PROCc
hek:IF(c%(X%,Y%)AND128)<>C%m%=1
  420 IFm%=1PRINTTAB(31,3)" Illegal":SOU
ND2,-10,5,15:FORA=1TO1500:NEXT:GOTO280
  430 PROCmc:SOUND1,-8,100,2:ENDPROC
  440 DEFPROCchek:m%=0:IFY%>3ANDY%<7ANDc
%(X%,Y%)>5ANDc%(X%,Y%)<8AND((X%=1ANDP%=2
)OR(X%=7ANDP%=6))P%=4
  450 IFY%>3ANDY%<7ANDc%(X%,Y%)>5ANDc%(X
%,Y%)<8ANDX%=4ANDP%=3P%=1
  460 IFY%>3ANDY%<7ANDc%(X%,Y%)>5ANDc%(X
%,Y%)<8ANDX%=4ANDP%=5P%=7
  470 IFABS(X%-P%)>1ORABS(Y%-Q%)>1m%=1
  480 IFABS(X%-P%)=1ANDABS(Y%-Q%)=1m%=1
  490 IFm%=1ANDY%=Q%ANDABS(X%-P%)=3ANDY%
>3ANDY%<7AND((c%(X%,Y%)AND127)=7OR(c%(X%
,Y%)AND127)=6)m%=0
  500 IFP%>1ANDP%<7ANDQ%>3ANDQ%<7ANDP%<>
4AND(c%(X%,Y%)AND127)<>1m%=1
  510 IFP%>7ORP%<1ORQ%>9ORQ%<1m%=1
  520 IF((P%=3AND(Q%=1ORQ%=9))OR(P%=5AND
(Q%=1ORQ%=9))OR(P%=4AND(Q%=2ORQ%=8)))AND
c%(P%,Q%)<>0m%=1
  530 IF(c%(X%,Y%)AND127)=1AND(c%(P%,Q%)
AND127)=8GOTO550
  540 IF(c%(P%,Q%)AND127)>=(c%(X%,Y%)AND
127)OR((c%(X%,Y%)AND127)=8AND(c%(P%,Q%)A
ND127)=1)m%=1
  550 IFc%(P%,Q%)<>0AND(c%(X%,Y%)AND128)
=(c%(P%,Q%)AND128)m%=1
  560 ENDPROC
  570 DEFPROCcompmove:R%=4:S%=9:T%=0:E%=
0:IF(c%(3,9)<128ANDc%(3,9)<>0)OR(c%(5,9)
<128ANDc%(5,9)<>0)OR(c%(4,8)<128ANDc%(4,
8)<>0)den%=1:GOTO820
  580 IF(c%(4,7)<128ANDc%(4,7)<>0)OR(c%(
2,9)<128ANDc%(2,9)<>0)OR(c%(6,9)<128ANDc
%(6,9)<>0)OR(c%(5,8)<128ANDc%(5,8)<>0)OR
(c%(3,8)<128ANDc%(3,8)<>0)den%=1:GOTO820
  590 den%=0:Y%=0:IFnm%<4GOTO630
  600 IFc%(4,2)=0R%=4:S%=2:GOTO820
  610 IFc%(3,1)=0R%=3:S%=1:GOTO820
```

Turn to Page 149 ▶

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```
  620 IFc%(5,1)=0R%=5:S%=1:GOTO820
  630 REPEAT:Y%=Y%+1:X%=0:REPEAT:X%=X%+1
:IFc%(X%,Y%)>128ORc%(X%,Y%)=0GOTO710
  640 PROCnext(X%,Y%):IFA%=1Q%=Y%+1:P%=X
%:PROCvl:E%=1:IFm%=0GOTO970
  650 IFB%=1Q%=Y%:P%=X%+1:PROCvl:E%=1:IF
m%=0GOTO970
  660 IFC%=1Q%=Y%-1:P%=X%:PROCvl:E%=1:IF
m%=0GOTO970
  670 IFD%=1Q%=Y%:P%=X%-1:PROCvl:E%=1:IF
m%=0GOTO970
  680 IFE%PROCnext(X%,Y%)
  690 IFA%=2ORB%=2ORC%=2ORD%=2PROCrunawa
y:IFm%=0GOTO970
  700 E%=0
  710 UNTILX%=7:UNTILY%=9:Y%=0:REPEAT:Y%
=Y%+1:X%=0:REPEAT:X%=X%+1:IFc%(X%,Y%)>12
8ORc%(X%,Y%)=0GOTO810
  720 IF(X%=3ANDY%=1)OR(X%=5ANDY%=1)OR(X
%=4ANDY%=2)GOTO810
  730 PROCnear(X%,Y%):IFB%=1Q%=Y%:P%=X%+
1:PROCvl:IFm%=0GOTO970
  740 IFC%=1Q%=Y%-1:P%=X%:PROCvl:IFm%=0G
OTO970
  750 IFD%=1Q%=Y%:P%=X%-1:PROCvl:IFm%=0G
OTO970
  760 IFCB%=1ORCD%=1Q%=Y%-1:P%=X%:PROCvl
:IFm%=0GOTO970
  770 IFAB%=1ORAD%=1Q%=Y%+1:P%=X%:PROCvl
:IFm%=0GOTO970
  780 IFCB%=1ORAB%=1Q%=Y%:P%=X%+1:PROCvl
:IFm%=0GOTO970
  790 IFCD%=1ORAD%=1Q%=Y%:P%=X%-1:PROCvl
:IFm%=0GOTO970
  800 IFA%=1Q%=Y%+1:P%=X%:PROCvl:IFm%=0G
OTO970
  810 UNTILX%=7:UNTILY%=9
  820 T%=0
  830 E%=RND(2):O%=E%AND1:PROCnearest(R%
,S%,T%):T%=N%:REPEAT:E%=E%AND1:P%=X%:Q%=
Y%:IFE%=0ANDX%>R%P%=X%-1
  840 IFE%=0ANDX%<R%P%=X%+1
  850 IF(E%=1ORX%=R%)ANDY%<S%Q%=Y%+1
  860 IF(E%=1ORX%=R%)ANDY%>S%Q%=Y%-1
  870 IFE%=0ANDX%=4ANDY%=7ANDc%(4,8)<>0P
%=X%-1:Q%=Y%
  880 IFE%=1ANDX%=4ANDY%=7ANDc%(4,8)<>0P
%=X%+1:Q%=Y%
  890 E%=E%EOR1:PROCvl:IFc%(P%,Q%)<128AN
Dc%(P%,Q%)<>0m%=1
  900 IFP%=4ANDQ%=1m%=1
  910 IFden%=1ANDc%(P%,Q%)=0m%=0
  920 UNTILm%=0ORE%=O%
  930 IFE%=O%ANDm%=1ANDden%=1GOTO590
  940 IFE%=O%ANDT%=100PROCmoveaway(0):GO
TO980
  950 IFE%=O%ANDm%=1GOTO830
  960 GOTO980
  970 UNTILTRUE:UNTILTRUE
  980 IFP%=X%ANDQ%=Y%PROCmoveaway(1)
  990 PROCmc:SOUND1,-8,100,2:ENDPROC
 1000 DEFPROCnext(E%,F%)
 1010 IFE%=P%ANDF%=Q%L%=c%(P%,Q%):c%(P%,
Q%)=c%(X%,Y%)
 1020 PROCcon(E%,F%+1,E%,F%):A%=U%:PROCc
on(E%+1,F%,E%,F%):B%=U%:PROCcon(E%,F%-1,
E%,F%):C%=U%:PROCcon(E%-1,F%,E%,F%):D%=U
%
 1030 IFE%=P%ANDF%=Q%c%(P%,Q%)=L%
 1040 ENDPROC
 1050 DEFPROCnearest(A%,B%,T%):D%=0
 1060 N%=100:FORQ%=1TO9:FORP%=1TO7
 1070 IFD%=1AND((P%=3ANDQ%=1)OR(P%=5ANDQ
%=1)OR(P%=4ANDQ%=2))GOTO1100
 1080 IFc%(P%,Q%)<128ANDc%(P%,Q%)<>0ANDA
BS(P%-A%)+ABS(Q%-B%)=N%ANDRND(2)=1X%=P%:
Y%=Q%
 1090 IFc%(P%,Q%)<128ANDc%(P%,Q%)<>0ANDA
BS(P%-A%)+ABS(Q%-B%)<N%ANDABS(P%-A%)+ABS
(Q%-B%)>T%X%=P%:Y%=Q%:N%=ABS(P%-A%)+ABS(
Q%-B%)
 1100 NEXT,
 1110 IFD%=1ANDN%=100D%=2:GOTO1060
 1120 IFD%=0AND((X%=3ANDY%=1)OR(X%=5ANDY
%=1)OR(X%=4ANDY%=2))D%=1:GOTO1060
 1130 ENDPROC
 1140 DEFPROCrunaway:A%=RND(4)
 1150 IFA%=1Q%=Y%-1:P%=X%
 1160 IFA%=2Q%=Y%:P%=X%-1
 1170 IFA%=3Q%=Y%+1:P%=X%
 1180 IFA%=4Q%=Y%:P%=X%+1
```

```
 1190 IFc%(P%,Q%)<>0GOTO1210
 1200 PROCvl:IFm%=0ENDPROC
 1210 FORS%=1TO4
 1220 IFS%=1Q%=Y%-1:P%=X%
 1230 IFS%=2Q%=Y%:P%=X%-1
 1240 IFS%=3Q%=Y%+1:P%=X%
 1250 IFS%=4Q%=Y%:P%=X%+1
 1260 IFc%(P%,Q%)<>0GOTO1280
 1270 PROCvl:IFm%=0S%=5
 1280 NEXT
 1290 IFS%=5m%=1
 1300 ENDPROC
 1310 DEFPROCcon(X%,Y%,E%,F%):p%=0
 1320 IFX%>7ORX%<1ORY%>9ORY%<1U%=0:ENDPR
OC
 1330 IFF%>3ANDF%<7ANDc%(E%,F%)<8AND((E%
=1ANDX%=2)OR(E%=7ANDX%=6))X%=4:p%=1
 1340 IFF%>3ANDF%<7ANDc%(E%,F%)<8ANDE%=4
ANDX%=5X%=7:p%=1
```

Turn to Page 150 ▶

Get it right!

```
  10 =    0 0  270 = 8EA0 1  530 = C1E8 1   790 = 3BD1 8  1050 = 34E4 2  1310 = D114 E
  20 =    0 0  280 = 6D25 A  540 = 42CC A   800 = C200 3  1060 = EBD0 4  1320 = 24E9 0  1570 = 7BF2 B
  30 = FAB6 6  290 = 1B11 F  550 = E27A 0   810 = BD55 A  1070 = 97DA 3  1330 = 8E94 3  1580 = 7C1B D
  40 = 75D2 4  300 = 2502 4  560 = ED0F 9   820 = 9766 0  1080 = 24DA E  1340 = A99D 6  1590 = 838B 6
  50 = 96EC B  310 = 174A 0  570 = AE63 3   830 = D235 4  1090 = 1BD8 0  1350 = 57C3 0  1600 = 2E0E D
  60 = 1469 D  320 = FC23 F  580 = 655A 1   840 = C21E 3  1100 = 8300 7  1360 = 8FD2 C  1610 =  CDD 7
  70 = B0C4 C  330 = E30F E  590 = 3EEC 8   850 = DE4B 6  1110 = 294E 4  1370 = F7B2 5  1620 = D84C 5
  80 = CA6A A  340 = 22A4 1  600 = DF02 7   860 = AA67 8  1120 = 4C44 A  1380 = 129D 5  1630 = 8144 D
  90 = D125 A  350 = 4F71 2  610 = 744B 6   870 = 2501 5  1130 = ED0F 9  1390 = B3BB 0  1640 = D84C 0
 100 = 36AC 2  360 = 6E78 3  620 = A303 F   880 = C2FF C  1140 = EDF2 7  1400 = FB88 D  1650 = BBDD 3
 110 = E424 3  370 = 661D 8  630 = 6F32 1   890 = 4F5C A  1150 = DF43 7  1410 = C866 A  1660 = D84C 2
 120 = 1A6A B  380 = E56F A  640 = 9CED B   900 = D2F9 D  1160 = 703E 5  1420 = 2734 C  1670 = 5FDD E
 130 = FD6A 3  390 = C36C 5  650 = 245D 7   910 = 3E8F 9  1170 = A94A 4  1430 = EE6C C  1680 = D84C 4
 140 = 41A3 6  400 =  AFE 6  660 =  6F9 8   920 = C6E5 2  1180 = D1FF E  1440 =  F77 C  1690 =  85F 1
 150 =   13 3  410 = 16B9 2  670 = 4154 F   930 = A156 9  1190 = 13CA 7  1450 = D5F2 2  1700 = ED0F 7
 160 = E597 1  420 = D391 6  680 = 255C F   940 = E120 6  1200 = BD1A 4  1460 = 751B 1  1710 = FEA6 8
 170 = ED0F F  430 = 8500 7  690 = 7E2E 3   950 = B644 3  1210 = 537F B  1470 = ED0F 2  1720 = 48C0 3
 180 = D8B5 F  440 = 933E A  700 = FA75 1   960 =  192 F  1220 = E086 6  1480 = 5B67 E  1730 = 499A 9
 190 = 3DAA F  450 = 7427 5  710 = 1F0A 9   970 = 4D81 9  1230 = 4FFB F  1490 = 303C 0  1740 = AD5E 7
 200 = D672 2  460 = D964 3  720 = 5FFC 2   980 = C61F 2  1240 = 968F 6  1500 = 8312 2  1750 = 6E87 7
 210 = BD40 5  470 = 1551 F  730 =  D7E 4   990 = 8500 C  1250 = EE3A 4  1510 = EA67 2  1760 = F76A 9
 220 = ED0F D  480 = 7125 8  740 = 3E97 7  1000 = F7DC 9  1260 = 6F73 6  1520 = A7B3 1  1770 = 3AAC 3
 230 = 9828 5  490 = AB97 5  750 = 2A93 8  1010 = 5746 8  1270 = 34A6 1  1530 = 22DA 5  1780 = 8DBC 4
 240 = 4236 F  500 = 9A71 B  760 = C1A7 6  1020 = B374 E  1280 = 2C83 D  1540 = ED0F B  1790 = 6953 2
 250 = 8B62 0  510 = 722A 8  770 = C971 2  1030 = 45C9 9  1290 = F4D3 9  1550 =  A84 8  1800 = 46D0 7
 260 = 96FC 5  520 = DC4B 3  780 = E530 8  1040 = ED0F 3  1300 = ED0F 3  1560 = E0A2 4  1810 = A02E 9
```

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```
 1350 IFF%>3ANDF%<7ANDc%(E%,F%)<8ANDE%=4
ANDX%=3X%=1:p%=1
 1360 IF(c%(X%,Y%)AND127)<(c%(E%,F%)AND1
27)U%=1ELSEU%=2
 1370 IF(c%(E%,F%)AND127)=1AND(c%(X%,Y%)
AND127)=8U%=1
 1380 IF(c%(E%,F%)AND127)=8AND(c%(X%,Y%)
AND127)=1U%=2
 1390 IFc%(X%,Y%)<128OR(c%(X%,Y%)AND127)
=(c%(E%,F%)AND127)U%=3
 1400 IFc%(X%,Y%)=0U%=0
 1410 IF((E%=3ANDF%=1)OR(E%=5ANDF%=1)OR(
E%=4ANDF%=2))ANDU%=2U%=3
 1420 IF((E%=3ANDF%=9)OR(E%=5ANDF%=9)OR(
E%=4ANDF%=8))ANDU%=2U%=3
 1430 IFF%>3ANDF%<7ANDE%<>1ANDE%<>4ANDE%
<>7ANDU%=2U%=3
 1440 IFY%>3ANDY%<7ANDX%<>1ANDX%<>4ANDX%
<>7ANDU%=1U%=3
 1450 IFp%=1ANDc%(X%,Y%)<>134ANDc%(X%,Y%
)<>135ANDc%(E%,F%)<>6ANDc%(E%,F%)<>7U%=0
 1460 IFp%=1ANDc%(X%,Y%)=136ANDU%=2U%=3
 1470 ENDPROC
 1480 DEFPROCmc:PROCprintchar(X%,Y%,c%(X
%,Y%)):PROCprintchar(P%,Q%,c%(X%,Y%))
 1490 IFc%(P%,Q%)<>0PROCprintchar(P%,Q%,
c%(P%,Q%))
 1500 IFc%(P%,Q%)<128ANDc%(P%,Q%)<>0nm%=
nm%-1
 1510 c%(P%,Q%)=c%(X%,Y%):c%(X%,Y%)=0:EN
DPROC
 1520 DEFPROCvl:PROCchek:PROCnext(P%,Q%)
 1530 IFA%=2ORB%=2ORC%=2ORD%=2m%=1
 1540 ENDPROC
 1550 DEFPROCnear(E%,F%):PROCcon(E%,F%+2
,E%,F%):A%=U%:PROCcon(E%+2,F%,E%,F%):B%=
U%:PROCcon(E%,F%-2,E%,F%):C%=U%:PROCcon(
E%-2,F%,E%,F%):D%=U%:PROCcon(E%+1,F%-1,E
%,F%):CB%=U%:PROCcon(E%+1,F%+1,E%,F%):AB
%=U%:PROCcon(E%-1,F%+1,E%,F%):AD%=U%
 1560 PROCcon(E%-1,F%-1,E%,F%):CD%=U%:EN
DPROC
 1570 DEFPROCmoveaway(pass%):Y%=0:X%=0
 1580 REPEAT:Y%=Y%+1:REPEAT:X%=X%+1:UNTI
LX%=8OR(c%(X%,Y%)<128ANDc%(X%,Y%)>0)
 1590 IFX%=8X%=0
 1600 UNTILY%=10OR(c%(X%,Y%)<128ANDc%(X%
,Y%)>0):IF Y%=10 P%=X%:Q%=Y%:ENDPROC
 1610 P%=X%+1:Q%=Y%:IFpass%PROCchek ELSE
PROCvl
 1620 IF m%=0 ENDPROC
 1630 P%=X%-1:Q%=Y%:IFpass%PROCchek ELSE
PROCvl
 1640 IF m%=0 ENDPROC
 1650 P%=X%:Q%=Y%-1:IFpass%PROCchek ELSE
PROCvl
 1660 IF m%=0 ENDPROC
 1670 P%=X%:Q%=Y%+1:IFpass%PROCchek ELSE
PROCvl
 1680 IF m%=0 ENDPROC
 1690 IF Y%<10 Y%=Y%-1:GOTO1580
 1700 ENDPROC
 1710 DEFPROCsetchars:RESTORE1740:FORD%=
1TO8:READE%,F%,C%:c%(E%,F%)=C%:c%(8-E%,1
0-F%)=C%+128:NEXT:FORY%=1TO9:FORX%=1TO7
 1720 IFc%(X%,Y%)<>0PROCprintchar(X%,Y%,
c%(X%,Y%))
 1730 NEXT,:ENDPROC
 1740 DATA1,1,7,7,1,6,2,2,3,6,2,2,1,3,1,
3,3,5,5,3,4,7,3,8
 1750 DEFPROCboard:GCOL0,1:FORX%=0TO7:MO
VE(X%*128),156:DRAW(X%*128),1024:NEXT:FO
RY%=0TO9:MOVE0,(Y%*96)+156:DRAW896,(Y%*9
6)+156:NEXT:GCOL0,2:MOVE132,728:MOVE380,
728:PLOT85,132,448:PLOT85,380,448:MOVE51
6,728:MOVE764,728:PLOT85,516,448
 1760 PLOT85,764,448:GCOL0,7:RESTORE1770
:FORA%=1TO10:READX%,Y%,R%:PROCcircle(X%,
Y%,R%):NEXT:ENDPROC
 1770 DATA448,204,44,448,204,32,448,976,
44,448,976,32,320,204,30,320,976,30,576,
204,30,576,976,30,448,300,30,448,880,30
 1780 DEFPROCcircle(X%,Y%,R%):VDU29,X%;Y
%;0;0;0;:MOVE0,R%:PX%=0:PY%=R%:FORA=0TO2
STEP0.5:X%=SIN(A)*R%:Y%=COS(A)*R%:MOVEPX
%,PY%:DRAWX%,Y%:MOVE-PX%,PY%:DRAW-X%,Y%:
MOVEPX%,-PY%:DRAWX%,-Y%:MOVE-PX%,-PY%:DR
AW-X%,-Y%:PX%=X%:PY%=Y%:NEXT
 1790 VDU29,0;0;0;0;0;:ENDPROC
 1800 *T.
 1810 FORA%=PAGE TOTOP+3STEP4:!(A%-&B00)
=!A%:NEXT:PAGE=&E00:$&100="O."+CHR$13+"R
UN"+CHR$13:FORC%=&100TO&106:OSCLI("*FX13
8,0,"+STR$(?C%)):NEXT
```

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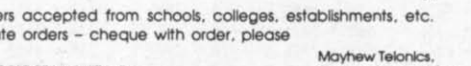

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Upbeat route to downloading

EIGHTEEN months after receiving my Acorn Teletext Adapter and sorting out many difficulties, I can now download telesoftware satisfactorily. And I think my findings may be of interest to others:

- *A wide band aerial is not good enough. Use one made for the channels in your area. Find the correct height for your location – the highest may not be the best.*
- *The signal must be good and pure. An aerial amplifier may help, but be sure that any spare outlets are properly terminated. Dummy loads can be bought from a dealer. Look at some pages of a program on telesoftware. Missing lines or a faulty header can produce bad data.*
- *The adapter may take up to one hour to settle down. Do not tune it or download until it is ready.*
- *Tuning is not easy. All four stations are difficult to find. Turn the controls very, very slowly. A 100 per cent signal on the tuning display does not mean perfect downloading.*
- *The adapter must plug direct into the 1MHz port. Daisychaining from another unit such as the Acorn Music 500 can cause distortion problems.*
- *Other roms – even official ones – may interfere with the teletext rom.*
- *Load a rom image into any sideways ram, otherwise it may fill with rubbish which could produce bad data.*
- *If there is a lot of bad data during downloading it could corrupt the disc. Always download to a spare disc.*
- *Constant bad data may be caused by faulty transmission. The BBC is very responsive and helpful. See page 195 of Ceefax on BBC 1. Contact them first for information about reception in your area – and last if all else fails.*
- *The beep with the bad data can be silenced with *FX212,1 and *FX213,30 will reduce the pitch. *FX214,1 will reduce the duration. Type them in before *TEL.*
- *Switch off the adapter when not in use. It can interfere with other programs, especially when loading and saving.*
- *Be patient and do not despair. The majority of programs are well worth the effort.*

If anyone doubts the value and quality of The Micro User *programs they should sample those provided on telesoftware. And they are all free!* – **David Richmond, Scarborough, North Yorkshire.**

Printer margins

IN the June 1987 issue of The Micro User, *A.B. Leonard asked how to use small sheets of paper in his Taxan printer.*

Most Epson compatible printers provide for left and right hand page margins. These can be used without a word processor to print pages as narrow as you wish.

When you input text you have to take care of things like split words at line endings and the paper-out facility will warn when the paper runs out.

The relevant codes for the Left Hand Margin are VDU 1,27,1,108,1,n (n can be any number from 0 to 78,0 to 93, or 0 to 133 depending on the font in use – Pica, Elite or Compressed). The Right Hand Margin codes are VDU 1,27,1,81,1,n (n can be from 2 to 80,3 to 96, or 4 to 137 depending on the font being used).

For an extreme example, VDU 2,1,27,1,108,1,4,27,1,81,1,6 would provide a left hand margin of five spaces and in Pica print with text two characters wide down a one inch wide strip of paper. – **John Henson, Dundonald, Kilmarnock.**

Envelope error

MAY I point out an error in my Envelope Find routine published in the Library of the February 1988 issue of The Micro User. *Line 40 should read:*

```
40 N%=N%-1:@%=0:B%=&8C0
```

– **Dave Clark, Cannock, Staffs.**

Win a tenner

● Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

Gazeter enhanced

*IT was nice to see my Gazeter program in print, but I'm sorry to say that one bug needs to be fixed. A friend found that *GAZE invents a variable* P *when the system variable* TOP *is used in the gazetted program.*

This is because TOP *is tokenised as a TO token – &B8 – and followed by the character P. The following patch will catch this oddity:*

```
2722 CMP #&B8
2723 BNE not_to_tkn
2724 INY:LDA (strt),Y
2725 CMP #ASC"P"
2726 BEQ inv
2727 DEY:BEQ inv
2728 .not_to_tkn
```

I strive for perfection, but as the great Dykstra said: "If debugging is the process of removing bugs, then programming must be the process of putting them in". – **Ray Wilson, St. Albans, Herts.**

Escaping from Break

*RECENTLY I have been using the command *FX200,3 in my program to disable Escape and produce a* Bad program *message when Break is pressed and OLD is typed. What exactly does this command do, and is there any way of combatting it after a Break?*

I want to know because I don't really want to take this out of my program but find it a bit of a nuisance having to reload it again. – **Paul Howieson, Portsmouth, Hants.**

● *FX200 alters the effects of Escape and Break. To work out the number following it you add two values.

The first concerns Escape: Make it zero so that Escape works normally and one to disable it.

The second value involves Break: For normal action it's zero, while a value of two makes sure that memory is cleared on Break.

By using *FX200,3 you're choosing to disable Escape and clear memory on Break (3=1+2). It's because you've cleared memory you get *Bad program*. To simply disable Escape use *FX200,1.

Screen dumping

I HAVE recently bought an Amstrad DMP 2000 printer to accompany my BBC B. It works perfectly, but I need a screen dump program for my GCSE course in computer studies.

Is a suitable program that I can use? – **P.B. Wren, Chatham, Kent.**

● Two main dump roms are available – Dumpout 3 from Watford Electronics and

Turn to Page 152 ▶

◀ *From Page 151*

Technomatic's Dumpmaster. Both will dump to any Epson compatible and various other printers.

Shadows of Mini Office II

I AM having problems with the compatibility of disc-based Mini Office II and Watford Electronics' 32k shadow ram board. When the shadow ram is activated Mini Office II refuses to run. Can you or your readers help me? – **A.J. Downer, ACT, Australia.**

● Unfortunately these two items are not compatible. However rom-based Instant Mini Office II will utilise all the popular shadow ram boards for the extra memory they provide.

Multi column lister re-visited

£10 Prize letter

UNTIL now I have been a passive reader of your excellent magazine. However I can now contribute some fixes for Steve James' very useful multi-column lister in the November 1987 issue of The Micro User.

As printed – and after L.J. Harper's fixes in the February 1988 issue – there are still a few annoying litle bugs, which the following changes will fix. The first allows the title option to be used:

```
180 prnt%=TRUE:title$="
```

The columns option incorrectly recalculates column width, resulting in the printing of alternate blank lines, thereby doubling the use of paper. This is cured by altering the –6 in line 390 to –7 to give:

```
390 DEFPROCcolwidth:
IF basic% colwidth%=
(width%/columns%)-7
ELSE colwidth%=(widt
h%/columns%)-2
```

The final alteration is to line 1590, avoiding errors found while listing various programs. Throughout the line change RIGHT$ to RIGHT$(and STR$(to STR$.

Many thanks for Get it Right! – it certainly reduces the time for entering each listing, not to mention the stress. – **Ian Lowry, Kings Heath, Brimingham.**

Correct use of CALL

WE would like to comment on your review of our Unitext computer assisted language learning – CALL – software in the February issue of The Micro User.

The reviewer's observations were generally accurate and fair, but left a negative impression of all CALL software.

We suspect this is because he really wants the micro to behave like the infinitely patient, intelligent but obedient human being – able to replace the teacher for most classroom activities.

This is not the case, nor is it likely to be so in the near future. Natural language is complex, subtle and imperfectly understood, and attempts to write CALL software to take account of all possible ways of translating even a short passage results in programs which are complex and effectively dedicated to a single text.

This has been done successfully – notably by Brian Farrington of the University of Aberdeen – but it is not something which can be done easily for any text by any teacher.

However, it is still possible to use CALL in its present state of development to good purpose in the classroom if you are able to recognise its potentialities and limitations.

The text reconstruction and substitution type of exercises are useful in promoting accuracy and memory skills, and they are acceptable and valuable to students if it is made clear that they are not translation exercises.

Incidentally, our students find that the scoring used in our test programs helps their motivation, even though it is not used by the teacher for assessment purposes.

It is important to remember that CALL is just one technological aid to language learning.

We have integrated its use into our language courses at Coventry Polytechnic and this frees the teacher for tasks which only he or she can do, such as intensive oral work with small groups.

We also ensure that texts and exercises used on the micro link closely with materials used in the language laboratories and with lectures and oral work, so that they are not encountered in isolation.

When CALL is used in this way, teachers need to produce a wide variety of exercises quickly and easily, and for this purpose authoring programs with a simple but flexible input are essential.

With the present state of development of computer hardware and software the exercises are limited in scope, but they can be very valuable if used correctly.

The best teaching aids are those which allow teachers to use a simple idea in imaginative ways, so they will then fully control the situation.

So you should not work towards completely replacing the teacher by a machine, for all kinds of reasons. – **Ann and Roy Benwell, Coventry Polytechnic.**

Master points

HERE are some observations about software compatibility that may be of interest to owners of a BBC Master:

● *There seems to be confusion concerning Master compatibility. I was resigned to losing, among other programs, Aviator and Acheton but I've found that Shift+Z+Break boots these perfectly.*

● *The rom situation is less happy though there are some surprises: Caretaker works tolerably as does Watford's NLQ Designer and Beebug's Help I.*

● *Acornsoft's OverView will run in sideways ram. Together with Macromate, Inform and a Winchester you have a self-contained system with the internal ram used fully, but the external cartridge slots free for permanently sited roms.*

● *View 2.1 works in sideways ram. This can be of value in the extending of *EXEC files to View's text mode. View 2.1 recognises *FX125 – as does Viewsheet – to switch from command to text modes, while View 3.0 does not.* – **Fraser Hadden, Hadleigh, Suffolk.**

Teletext trials

I BOUGHT a teletext adapter through your magazine primarily to download computer software and it appears to function very well. However, to my disappointment I often find, when I run the programs, lots of error reports.

Take the program Diary: As I run it the menu is displayed, but when I select an item I get a syntax error. Can you please help? – **J.Stevenson, Sherborne, Dorset.**

● We have had similar problems from time to time – our solution was to turn off the adapter when running programs.

Archimedes twists

The letter in the February issue of The Micro User *from Mr Maxwell gave some twists on the word Archimedes. It may interest you to know that Arthur has the meaning:* Acorn Risc by THURsday – **Paul Hancocks, Wakefield, West Yorkshire.**

Checksum solutions

WHAT has Steve Turnbull done? There I was, retired, happily using my BBC Micro as a machine for spreadsheets and writing letters, plus occasional games...

*I then type in Pinball from the February issue, start line checking then decide to try the Short Checksum routine from the same issue. Next I type *xs and away it goes until line 770. The remainder of*

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Pinball had to be read sum by sum as the check digit was, of course, wrong from that line.

My Pinball runs without apparent error and line 770 as printed looks logical enough so, please, what is the fault at 770 that consistently gives me D602 instead of FCC?

However, that's not the real problem. Thinking that a simple print error might be causing the checksum's difference I isolated line 770 and set up all the variations I could think of, without success.

"How does this CRC system work, anyway?" I asked myself. So, back through three and a half years Micro User*: Relearn hex numerals, realise I don't understand machine code, sort out all the technical articles from past journals and set up a filing system as a prelude to trying to understand instead of just read.*

Next, several hours in the public library where I find a few mentions of CRC but no worked example and only one explanation: A few lines of text, no doubt precise, but not exactly forthcoming as to the mathematics.

So please, would someone show how checksums are calculated?

Congratulations on your excellent magazine which, as you can see, is seriously affecting my peace of mind. – **A.E. Meadowcroft, Horton, Northants.**

● Sorry about line 770 – our checksum was wrong, amply demonstrating checksums' raison d'être.

The trouble with storing, copying or transmitting computer data is that it's so easy for it to go wrong and the information to be corrupted.

Because of noise in a telephone line or some other glitch, a 0 can become a 1 or vice versa. In the case of entering a listing, you might provide the hiccup by making a typing mistake.

Errors are a fact of computer life and dealing with them comes down to two problems:

- How do you detect an error in the first place?
- When you find one, how do you correct it?

There are various methods of finding errors in data. Using parity bits is the most frequently mentioned – basically making sure that the bits in the data consistently add up to an even or odd sum. A more modern and reliable technique involves things known as polynomials and lots of maths. Happily this is dealt with by the micro.

Whatever method is used, however, it inevitably means that check bits are associated with the original data. These are known as the checksum and are extremely allergic to any changes in the data.

When the data is received or used, the computer can apply the same methods to the received data and see if the result corresponds to the checksum that came with it. If it does fine and good. If it doesn't then there's probably an error in the data (or possibly in the attached checksum, which may itself have been corrupted).

In the case of listings checksums, the data received is the program line you typed in, and you're the computer making sure the checksums match.

Notice that the checksum is associated with the data, but not part of it. In effect, it's extra to the message, or redundant. And the more you want to increase the chances of finding an error, the more redundant bits have to be added to the message. They're not part of the data, but data about the data!

Once an error is found, there are several strategies for dealing with it. When entering listings you just have to check for mistyping.

Computers, however, can be more sophisticated when talking to each other. They could retransmit the whole thing until they get it right, but this is rather drastic as only a bit of data may be wrong.

Basically, what a cyclic redundancy check does is cycle each significant bit of the data through the checksum eight times altering it – but zeros are not cycled: They are redundant. This is highly sensitive to the slightest change in data.

The BBC Micro's cassette system uses CRC, and page 399 of the original User Guide gives an algorithm showing how it works.

£10 Prize letter

Memory functions

IN reply to J.M. Fielder's letter in your December 1987 issue, screen memory in the B+ and Master 128 can be loaded or saved using addresses in the range &FFFE0000 to &FFFE8000.

Listing I provides two Tube compatible procedures to load and save screens in any mode.

Direct byte access can be easily achieved in either of two ways on the B+, the Master 128 and the Tube at the same time.

The osword calls five and six with the address between &FFFE0000 and &FFFE8000 can be used to access screen memory over the Tube on the B+, but according to the New Advanced User Guide on a Master 128 they address the 64k of sideways ram instead.

This is the technique used by the function and procedure in Listing II.

Acorn has provided two new operating system routines – oswrsc at &FFB3 and osrdsc, formerly osrdrm, at &FFB9.

Oswrsc pokes the byte in the accumulator into screen memory at the address pointed to by &D6,&D7 and the Y register, whereas osrdsc uses the vector &F6, &F7 and returns the value in the accumulator.

This technique has been implemented on both the B+ and the Master, but is not compatible with a second processor. This is used in Listing III.

```
DEF PROCscreenload(f$)
PROCos("LOAD "+f$+" FFFE"+
STR~FNscreenbase)
ENDPROC
DEF PROCscreensave(f$)
PROCos("SAVE "+f$+" FFFE"+
STR~FNscreenbase+" FFFE800
0")
ENDPROC
DEF PROCos($&700)
LOCAL X%,Y%:Y%=7
CALL&FFF7:ENDPROC
DEF FNscreenbase
LOCAL A%,X%,Y%:A%=135
Y%=(USR(&FFF4)AND&FF0000)D
IV&10000
IF Y%<3 THEN =&3000
IF Y%=3 THEN =&4000
IF Y%<6 THEN =&5800
IF Y%=6 THEN =&6000
=&7C00
```

Listing I

```
DEF FNread(address%)
?&F6=address%
?&F7=address%DIV256
=USR(&FFB9)AND&FF
DEF PROCwrite(addr%,byte%)
LOCAL Y%,A%:?&D6=addr%
?&D7=addr%DIV256
A%=byte%:CALL&FFB3
ENDPROC
```

Listing II

```
DEF FNread(offs%)
LOCAL A%,X%,Y%:A%=5
X%=&700:Y%=X%DIV256
!X%=&FFFE0000+offs%
CALL&FFF1:=X%?4
DEF PROCwrite(offs%,byte%)
LOCAL A%,X%,Y%:A%=6
X%=&700:Y%=X%DIV256
!X%=&FFFE0000+offs%
X%?4=byte%:CALL&FFF1
ENDPROC
```

Listing III

– **P.J. Dellar (age 15), Harpenden, Hertfordshire.**

Sprite surprise

WHY, when Roland Waddilove wrote Bouncing Sprites in your May 1987 issue, did he use the label loop *twice?.*

The program worked fine, as do all his programs, but I thought you were only allowed to define a label once for a

Turn to Page 154 ▶

◀ From Page 153

program and not to use it again.

I admire the way the programs were written and I understood everything he was trying to convey. If he ever writes a book on the subject please make sure we know about it.

I have been a subscriber to The Micro User *since day one, and like the way that it has changed style over the years.* – **K. Lawler, Dewsbury, W. Yorks.**

● *Roland Waddilove replies:* Thanks for the praise, I'm glad you liked the series.

To answer your question: Although re-using labels is not good programming practice in general, thinking up names for loops can get very tiresome. And as long as it's a backwards reference – the jump to the label occurs after the label is defined – it is actually safe to re-use the label name.

The Micro in education

I DISAGREE with the views put forward in the article "Heaven help the pupils" in the February issue.

Being a teacher, I usually look at the education section first when I buy The Micro User. *I am horrified that a person, who I assume is a school governor, should publish through your magazine such an insensitive and irresponsible set of one-sided one-liners. Heaven help the rest of his school community – teachers, pupils and fellow governors.*

I am even more surprised that you have billed his article as "a look at the future role of the BBC Micro in primary education". Perhaps an article by one of Her Majesty's Inspectors or some other spokesman from the Department of Education and Science, or a leading educationalist might be appropriately billed as that.

I expected some words of wisdom on future hardware or software developments. I hoped for reports of curriculum innovation and development that I know are taking place around the country. It was nothing of the sort.

I am a support teacher – not an expert – employed by a local education authority to help other teachers find appropriate places within the curriculum, for the use of micros. My work centres around how supporting teachers manage their classroom.

In the absence of any more qualified response to Bob Redrup, please allow me the opportunity to reply to some of the points that he makes. They are either sweeping in their judgement, or just totally out of order. I feel I must reply.

The article is full of throw-away one-liners and little real evidence to support them, other than a single experience and a few reported conversations.

In my job I see a much more positive aspect of the developing use of computers, in more than one school. I see the creative use of IT and CAD in classrooms.

I see children learning to use file handling as a research tool. I see them using word processing as a means to refining language.

I also see stimulating micro-based simulations enriching many areas of the curriculum. I even see children creatively using simple programming skills, with languages like Logo.

The teachers are not computer freaks. They are hesitant at the keyboard, but they know when to apply this powerful "beast" so that their children are not.

What I see leads me to think that the role of micros in classrooms is in good hands. Bob Redrup should take a longer and closer look.

I agree that all is not perfect. We do need to improve, adapt and also need time, money and above all support. The LEA I work for is doing its best, as I am sure are other LEAs, but we need government support, parents' support, colleagues' support and – dare I suggest it – the understanding and support of school governors.

If there is a nightmare in education, it is not that children will grow up technologically illiterate, they will see to that. It seems that if Mr Redrup has his way though, they may grow up thinking that being able to program a computer is a more important skill than being sensitive to people's feelings, values and thoughts.

On the other hand, if we get that aspect of our children's education right, we need not fret about them despising us for being less skilful in things that are less important. If we get it wrong, Heaven help us all. – **Mick Nadal, West Bridgford, Nottingham.**

● Bob Redrup's article has raised quite a few hackles among the teaching profession, the above being just a short extract of Mr. Nadal's letter, which seems to summarise the opposing view.

Diagrammatical errors?

HAVING just read the review of our Diagram II package for the Archimedes, I felt obliged to point out a few facts that your reviewer appears to have missed.

I thought the review of the features of Diagram II was fair, although one error was when it was stated that only the standard font was loadable on to the screen. It is in fact possible to load any defined font to the screen.

Also the statement that you are limited to 1024, 8 by 8 blocks is not a problem unless you try to produce art type drawings which – we specifically state in the handbook – is not what the program is designed for.

What concerned me more was the fact that the review criticised the program mainly because of the fact that it was a "hurried" transfer to the new machine and "only ran on the emulator".

We have in fact produced this version of Diagram II at the request of our customers, while developing much more comprehensive CAD software to run on the native machine.

We had many phone calls from companies before Christmas saying that they were considering purchasing Archimedes machines to replace their existing BBC Micros but would only do so if we could get Diagram II running on the Archimedes.

It seemed obvious to us that because of the estimated 9 to 12 months to produce software worthy of the Archimedes, it would help Archimedes sales by providing Diagram II as a temporary version on the Emulator.

As to the cost of the program, which the review states is expensive, all existing owners of Diagram II get the Archimedes version completely free, and we are one of the few companies who offer our customers a full money back guarantee with our software. If they do not think our software is worth the price we charge, they can have a full refund. We have not had requests for this so far.

Since there is so little software available at the present time for the Archimedes I find it difficult to understand why your magazine should criticise us for providing our current software quickly via the emulator, while producing new software to complement the full features of the machine.

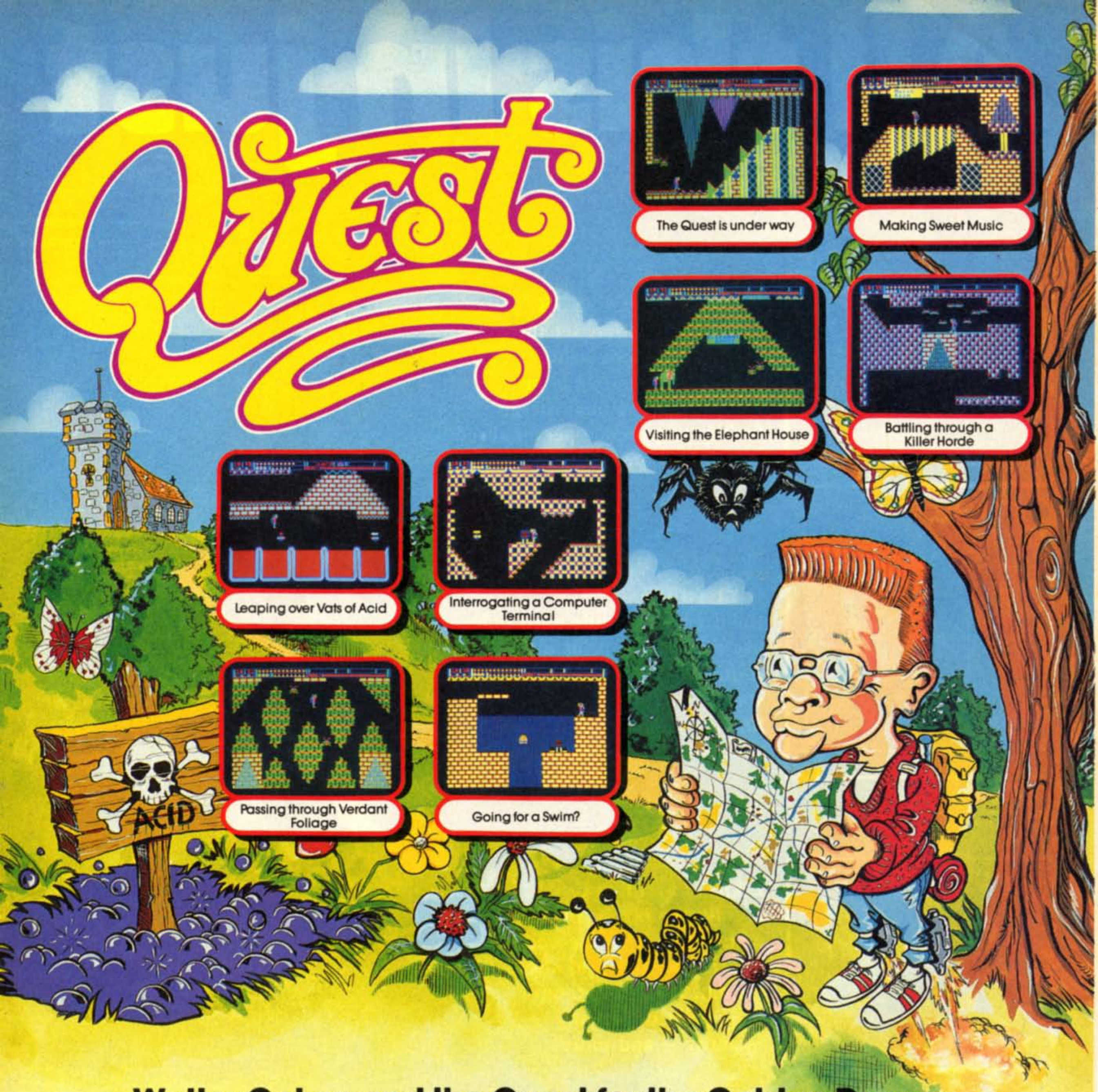
We were not one of the lucky companies to get an early version of the Archimedes, and I think it would be true to say that if all companies like us spent the next nine months writing high quality software for the machine, then at the end of that time we would not have any Archimedes owners to sell it to. – **Jim Daniels, Pineapple Software, Ilford, Essex.**

GCC plea

WE have been given a BBC Ram-Rom 15, manufactured by GCC (Cambridge), who have now gone out of business.

We have no instructions for it and I wonder if anyone out there has a handbook they could lend us? – **Chris Ward, Head of Physics, Lodge Park School, Shetland Way, Corby, NN17 2JH.**

● Can any reader help?



The Quest is under way

Making Sweet Music

Visiting the Elephant House

Battling through a Killer Horde

Leaping over Vats of Acid

Interrogating a Computer Terminal

Passing through Verdant Foliage

Going for a Swim?

Walter Cobra and the Quest for the Golden Dragon

You are Walter Cobra, a clever but absent-minded young lad who spends many hours indulging in two favourite hobbies: exploring, and inventing. One day, to your surprise, you stumble across a faded old map which indicates the route to a buried object marked as "The Golden Dragon". You recognise the starting-point on the map as being a wishing-well located a couple of miles away from your home. Full of anticipation, you decide to begin your quest the following day.

The next day, as the sun is rising you excitedly get out of bed, pack your rucksack with a few provisions, and then don your jet-boots — an astounding invention which enables you to fly for short periods of time. You amble over towards the wishing-well and slowly climb down the walls of the well. It's quite deep, but finally you reach the bottom. You then suddenly realise that you have left behind a very important item, the map.

You decide to press on regardless. You remember some of the places shown on the map: "The Music Room", "The Joke Shop", "The Chapel"; but, bearing in mind the size of the map, this quest will surely be the greatest challenge of your life!

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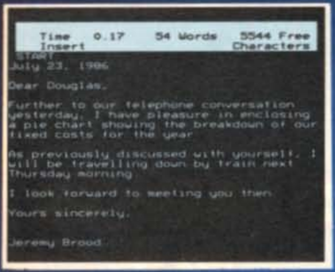
All this in just



```
  Time   0.17    54 Words   5544 Free
  Insert                    Characters
 START
July 23, 1986

Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year

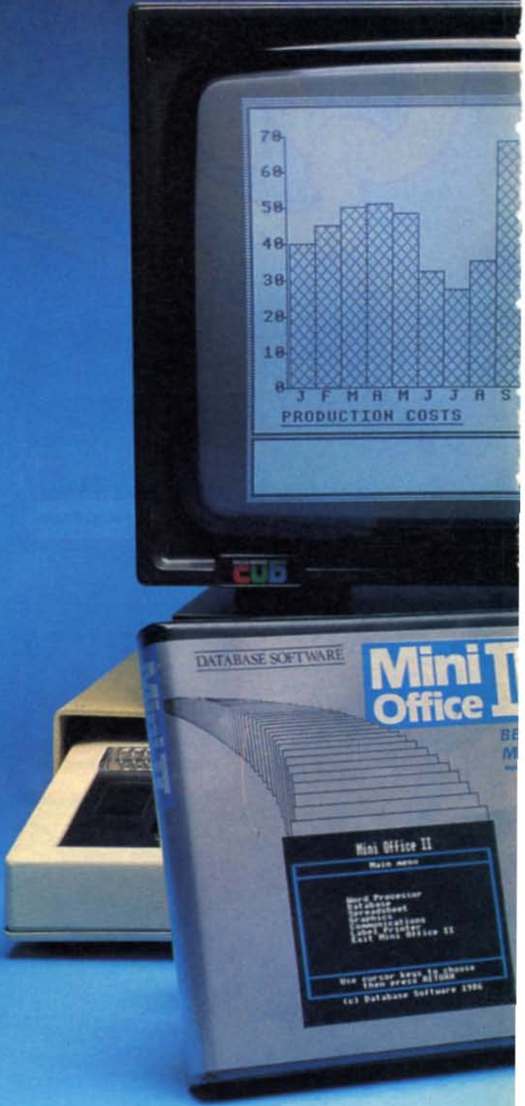
As previously discussed with yourself, I
will be travelling down by train next
Thursday morning

I look forward to meeting you then

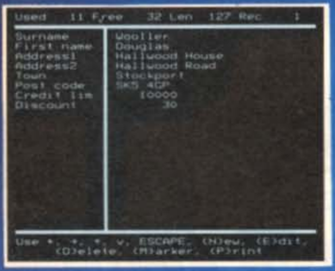
Yours sincerely,


Jeremy Brood
```

WORD PROCESSOR
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!

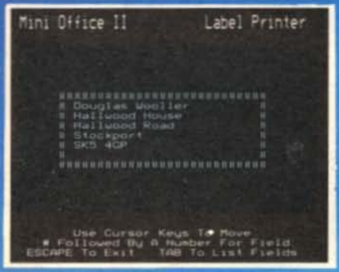


70
60
50
40
30
20
10
0
J F M A M J J A S
PRODUCTION COSTS
CUB
DATABASE SOFTWARE
Mini Office II
Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose
then press RETURN
(c) Database Software 1986



```
Used   11 Free   32 Len  127 Rec    1
--------------------------------------
Surname      | Wooller
First name   | Douglas
Address1     | Hallwood House
Address2     | Hallwood Road
Town         | Stockport
Post code    | SK5 4GP
Credit lim   |     10000
Discount     |        30
--------------------------------------
Use ←, →, ↑, ↓, ESCAPE, (N)ew, (E)dit,
     (D)elete, (M)arker, (P)rint
```

DATABASE
Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



```
Mini Office II              Label Printer



    ##############################
    # Douglas Wooller            #
    # Hallwood House             #
    # Hallwood Road              #
    # Stockport                  #
    # SK5 4GP                    #
    #                            #
    ##############################



       Use Cursor Keys To Move
   # Followed By A Number For Field
 ESCAPE To Exit     TAB To List Fields
```

LABEL PRINTER
Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

...and at a price

Mini Office II is a comprehensive integreated suite of programs setting a new standard in home and business software.

These sample screenshots illustrate just a few of the wide range of features, many of which are usually only available on software costing hundreds of pounds. Most are easily accessed by using cursor keys to move up and down a list of options and pressing Return to select.

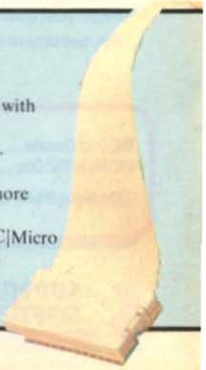
Mini Office II takes over where the original, highly successful Mini Office left off, with numerous extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, easy to follow manual.

And it's at a price everyone can afford!

DATABASE SOFTWARE

Europa House, Adlington Park,
Adlington, Macclesfield SK10 4NP.

Now available on a power-packed rom board!



- Four 32k roms on one board packed with 128k of super fast machine code.
- Easy to install – no soldering needed.
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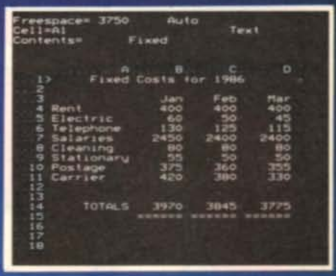
ONE package!

SPREADSHEET

Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!



```
Freespace= 3750     Auto
Cell=A1                    Text
Contents=        Fixed

            A       B       C       D
  1>      Fixed Costs for 1986
  2
  3                Jan     Feb     Mar
  4 Rent           400     400     400
  5 Electric        60      50      45
  6 Telephone      130     125     115
  7 Salaries      2450    2400    2400
  8 Cleaning        80      80      80
  9 Stationary      55      50      50
 10 Postage        375     360     355
 11 Carrier        420     380     330
 12
 13
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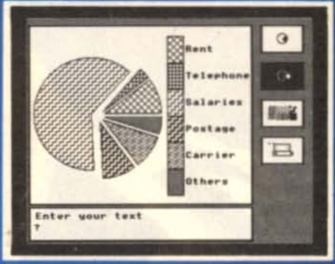

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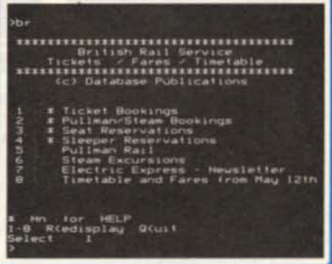

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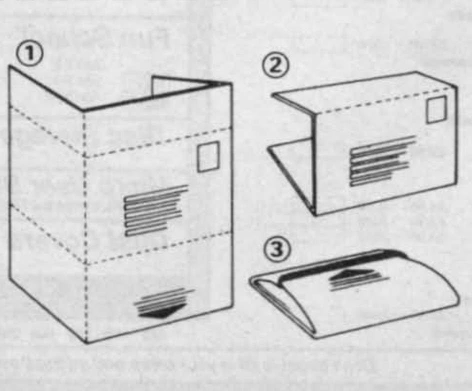

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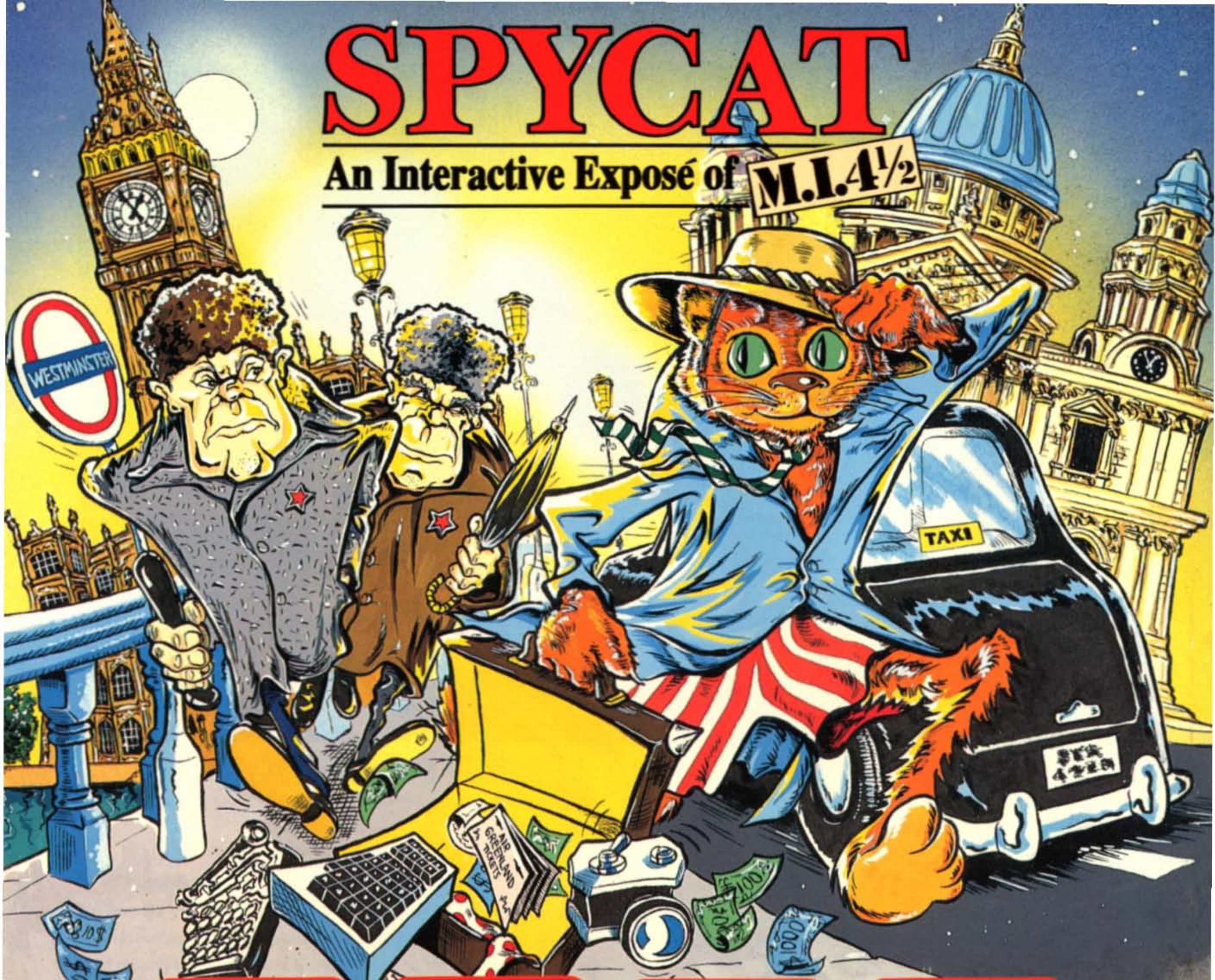
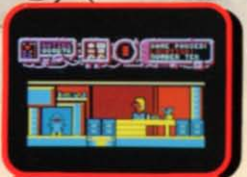
SPYCAT

An Interactive Exposé of M.I.4½



The London Skyline Viewed from Blackhall

Outside No. 10 Drowning Street


Meeting the P.M.

Waiting to see "M"

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